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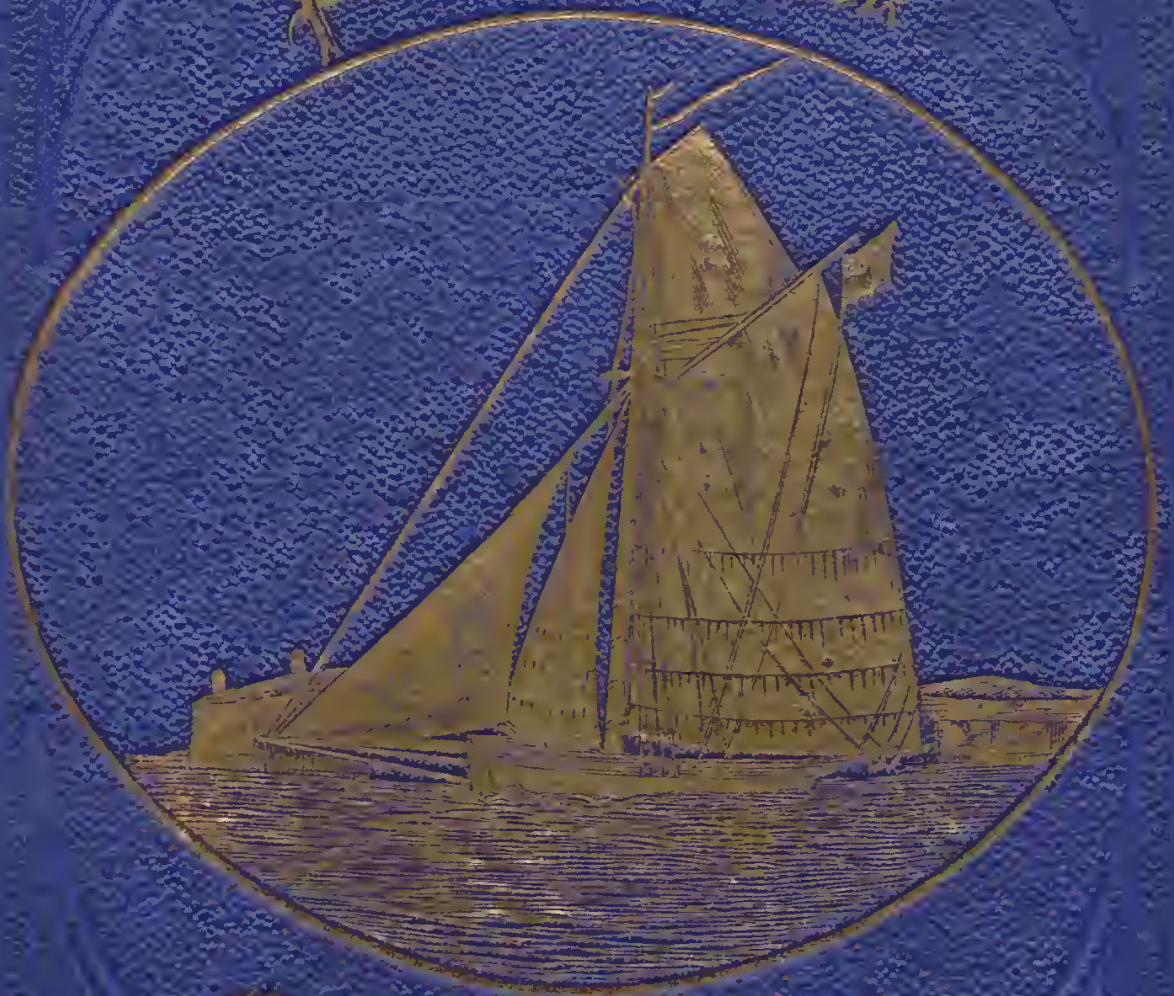

FOR THE English Channel

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THE PILOT'S HANDBOOK

FOR THE

ENGLISH CHANNEL;

CONTAINING CONCISE DIRECTIONS FOR
ENTERING AND NAVIGATING THE CHANNEL, AND FOR
ALL THE HARBOURS AND ANCHORAGES ON THE ENGLISH COAST,
FROM THE SCILLY ISLANDS TO THE NORTH FORELAND.

ILLUSTRATED BY SEVENTEEN PLATES.

BY

STAFF COMMANDER JOHN W. KING, R.N.
Late Naval Assistant, Hydrographic Department, Admiralty.

SIXTH EDITION.

"The Christian hath a compass and a chart,
A Pilot who o'er troubled waves can steer;
A pole-star that doth confidence impart,
And if his light is narrow it is clear."

LONDON:
Sold by J. D. POTTER, 31 *Poultry, and* 11 *King Street, Tower Hill;*
AND BY
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1874.

Price Six Shillings and Sixpence.

The following TESTIMONIALS have been received by the AUTHOR since the publication of the FIRST EDITION of this WORK. The first is from the late EMPEROR of the FRENCH :—

"*Plombières, le* 31 *juillet*, 1865.

"MONSIEUR,

"J'ai reçu votre Manuel des Pilotes de la Manche. C'est un livre bien fait, dont j'apprécie le mérite et qui me paraît destiné à rendre les meilleurs services. Je vous félicite de l'avoir écrit et je vous remercie de me l'avoir envoyé. Recevez l'assurance de mes sentiments.

"NAPOLÉON.

"Monsieur le Commandante J. W. KING, R.N.,
au Bureau Hydrographique de l'Amirauté."

"Your capital little Pilot's Handbook for the English Channel met with much approval at the meeting of the Royal Yacht Squadron. To Masters of Coasters it will be invaluable, as well as to all Yacht sailors."—*The Right Honourable Lord de Ros.*

"I am sure your Pilot's Handbook will be of great value to all seamen."—*Admiral the Right Honourable Thomas Earl of Lauderdale, K.C.B.*

"Your Pilot's Handbook is a most useful work."—*The Right Honourable T. Milner Gibson, President of the Board of Trade.*

"Your Handbook well deserves the patronage it has received, and only requires to be better known to become generally adopted. It was much admired by the Trinity Board, and thirty copies ordered. The Chairman of our Examining Committee is so pleased with it that he has also ordered twenty copies to be supplied to his ships."—*Vice-Admiral R. Collinson, C.B., Elder Brother of the Trinity.*

"Having had much experience in navigating the English Channel, I consider your little Handbook a most valuable Assistant to all navigators entering or leaving it. The Directors of the Peninsular and Oriental Company think so highly of it that they have supplied a copy to each of their ships."—*Vice-Admiral Sir W. H. Hall, K.C.B., Director of Peninsular and Oriental Company.*

"Your Handbook is proving very useful to the rising officers of the day, as indeed it has already been to the seniors of the Navigating Class."—*Captain Frederick J. O. Evans, R.N., F.R.S., Chief Naval Assistant, Hydrographic Department, Admiralty.*

"I feel certain that all young officers when navigating the Channel will bless you."—*Commander J. K. Martyn, R.N., Master Attendant, H.M. Dockyard, Sheerness.*

"Your Handbook is just the sort of ready information we all found the want of when navigating the Channel. The illustrations explanatory of the Tides in Dover Strait are particularly useful, and if properly studied will save many a wreck."—*Staff Commander J. F. Boxer, R.N., Harbour Master, Folkestone.*

"Your valuable little publication is just what was wanted. I feel certain it will beat all other Channel Pilotage out of the field."—*Staff Captain George Marsh, R.N., Queen's Harbour Master, Plymouth.*

"I consider it a very useful book, and quite sufficient for the navigation of the Channel."—*Staff Captain H. A. Moriarty, R.N., C.B., Master Attendant and Queen's Harbour Master, Portsmouth.*

"Your Pilot's Handbook appears complete."—*Commander J. Brown, R.N., Master Attendant, H.M. Dockyard, Devonport.*

"Your Handbook is the very thing for the seaman who wishes to become acquainted with, or keep up his knowledge of, the Pilotage of the Channel."—*Staff Captain F. H. May, R.N., Master Attendant, H.M. Dockyard, Sheerness.*

"Your book will be the means of saving more lives than my life-boats."—*John White, Esq., West Cowes, Isle of Wight.*

"Such a work will be an invaluable friend to the mariner. No seaman should show his nose in the Channel without it."—*Nautical Magazine, March*, 1861.

PREFACE TO FIRST EDITION.

It is with much diffidence that the Author of this little volume ventures to offer it to nautical men amidst the numerous works already extant on the Navigation of the English Channel. He was induced to undertake its compilation from the often expressed wish of his brother officers, who "felt a want of concise but yet *correct* directions to refer to when qualifying themselves for Channel Pilots."

The Author has, therefore, endeavoured to combine their wishes with the requests of others, and to give to the maritime world a Pocket Book containing general, brief, and plain Directions for entering and navigating the English Channel, and for *all* the Harbours and Anchorages on the S.W., South, and S.E. Coasts of England, from the Scilly Islands to the North Foreland. A few Plates are also introduced to illustrate the Coasts and Harbours, and to show the meeting and separation of the Tidal Streams in Dover Strait, a thorough knowledge of which is so essential to the safety of ships when navigating in that locality.

London, November, 1863.

Any notice of errors or omissions that may be discovered in this work will be thankfully received and acknowledged by Captain J. W. King, R.N., Vernon House, Worthing, Sussex.

STEERING AND SAILING RULES.

Extract from Order in Council, dated 9th January, 1863.

ART. 11. If Two Sailing Ships are meeting End on, or nearly End on, so as to involve Risk of Collision, the Helms of Both shall be put to Port, so that each may pass on the Port Side of the other.

ART. 12. When Two Sailing Ships are crossing so as to involve Risk of Collision, then, if they have the Wind on different Sides, the Ship with the Wind on the Port Side shall keep out of the Way of the Ship with the wind on the Starboard Side, except in the case in which the Ship with the Wind on the Port Side is close hauled and the other Ship free, in which case the latter Ship shall keep out of the way; but if they have the Wind on the same side, or if One of them has the Wind aft, the Ship which is to Windward shall keep out of the Way of the Ship which is to Leeward.

ART. 13. If Two Ships under Steam are meeting End on, or nearly End on, so as to involve Risk of Collision, the Helms of both shall be put to Port, so that each may pass on the Port Side of the other.

ART. 14. *If two Ships under Steam are crossing so as to involve Risk of Collision, the Ship which has the other on her own Starboard Side shall keep out of the Way of the other.**

ART. 15. If Two Ships, one of which is a Sailing Ship and the other a Steam Ship, are proceeding in such Directions as to involve a Risk of Collision, the Steam Ship shall keep out of the Way of the Sailing Ship.

ART. 16. Every Steam Ship when approaching another Ship so as to involve Risk of Collision, shall slacken her Speed, or, if necessary, stop and reverse; and every Steam Ship shall, when in a Fog, go at a moderate Speed.

ART. 17. Every Vessel overtaking any other Vessel shall keep out of the Way of the said last-mentioned Vessel.

ART. 18. When, by the above Rules (Articles 12, 14, 15, and 17), One of Two Ships is to keep out of the Way, the other shall keep her Course, subject to the Qualifications contained in the following Article:—

ART. 19. In obeying and construing these Rules due regard must be had to all Dangers of Navigation; and due regard must also be had to any Special Circumstances which may exist in any particular case rendering a Departure from the above Rules necessary to avoid immediate Danger.

Order in Council, dated 30th July, 1868, explaining the above Articles 11 and 13.

The said Two Articles 11 and 13 respectively only apply to cases where Ships are meeting End on, or nearly End on, *in such a manner as to involve Risk of Collision.* They, consequently, do not apply to Two Ships which must, if both keep on their respective Courses, pass clear of each other.

The only cases in which the said Two Articles apply are when each of the Two Ships is End on, or nearly End on, to the other; in other words, to cases in which, *by Day*, each Ship sees the Masts of the other in a line, or nearly in a line, with her own; and *by Night*, to cases in which each Ship is in such a position as to see both the side Lights of the other.

The said Two Articles do not apply *by Day* to cases in which a Ship sees another *a-head* crossing her own Course; or *by Night*, to cases where the Red Light of one Ship is opposed to the Red Light of the other; or where the Green Light of one Ship is opposed to the Green Light of the other; or where a Red Light without a Green Light, or a Green Light without a Red Light, is seen a-head; or where both Green and Red Lights are seen anywhere but a-head.

Fog Signals.

Whenever there is a Fog, whether by day or night, the following Fog Signals shall be carried and used, and sounded at least every Five Minutes:—

(*a*) Steam Ships under way shall use a Steam Whistle placed before the funnel, not less than 8 ft. from the deck.

(*b*) Sailing Ships under way shall use a Fog Horn.

(*c*) Steam Ships and Sailing Ships when not under way shall use a Bell.

* The reckless use of Port Helm leads to Collision.

Bearings and Distances from Headland to Headland, &c., in the English Channel.

Names of Places.	Magnetic Bearings.	Distance in nautic. miles.
20 m. South of St. Agnes Lt. to Beachy Head (*passing 12 miles from Lizard, 15 from Eddystone, 10 from Start, 15 from Bill of Portland, 6 from St. Catherine Pt., 4 from Owers Lt.*)	E. ½ S.	253
Ushant N.W. Lt. to St. Agnes Lt.	N. ½ W.	98½
,, Lizard Lts.	N. by E. ¾ E.	90
,, Eddystone Lt.	N.E. ½ N.	108
,, Start Lt.	N.E. ½ E.	121
,, Portland Lts.	N.E. by E. ½ E.	163
,, Needles Lt.	E.N.E.	191
,, St. Catherine Lt.	E. by N. ¾ N.	197
St. Agnes Lt. to Bishop Lt.	W. ¾ N.	4
,, Longships Lt.	E. ¼ N.	26
,, Lizard Lts.	E. by S. ½ S.	44
,, Casquets Lts.	S.E. by E. ¾ E.	153
,, Hanois Lt. (Guernsey)	S.E. by E. ¼ E.	144
Longships Lt. to Seven Stones Lts.	W. by N. ¾ N.	12½
,, Runnel Stone	S.S.E.	4
Wolf Lt. to St. Agnes Lt.	W. by N. ¼ N.	20¾
,, Seven Stones Lts.	N.W. by N.	12¼
,, Longships Lt.	N.E. ¼ N.	7¾
,, Runnel Stone	E. by N. ¾ N.	7
,, Lizard Lts.	E.S.E.	23
Lizard Lts. to Runnel Stone	N.W. ¾ W.	18½
,, Rame Head	E. ¾ N.	44
,, Eddystone Lt.	E. ¼ S.	39
,, Start Lt.	E. ¾ S.	63
,, St. Catherine Lt. (passing ½ m. outside Start).	E. ¾ S.	153
,, Beachy Head Lt. (passing 2 m. outside Start, and 2 m. outside Owers).	E. ¾ S.	212
,, Casquets Lts.	S.E. by E. ½ E.	119
,, Hanois Lts.	S.E. ½ E.	103
Eddystone Lt. to St. Anthony Pt. Lt.	W. by N. ½ N.	29
,, Rame Head	N.E. by N.	8
,, Breakwater Lt.	N.E. ¼ E.	10
,, Praul Pt.	E. by S. ¾ S.	21¼
,, Casquets Lts.	S.E. ¼ E.	78
,, Hanois Lt.	S.S.E. ¾ E.	75
Start Lt. to Downend Pt.	N.E. ¾ E.	9
,, Portland Bill (*extreme*)	East	49
,, St. Catherine Lt.	E. ¾ S.	92
,, Beachy Head (*extreme*)	E. ¾ S. (southerly)	150
,, Casquets Lts.	S.E. ¾ S.	57
,, Hanois Lt.	S. by E. ½ E.	60
Berry Head to Hopes Nose	N.N.E.	3¾
,, Beer Head	N.E. by E. ¾ E.	22¾
,, Portland Bill (*extreme*)	E. by S. ¼ S.	40½

Names of Places.	Magnetic Bearings.	Distance in nautic. miles.
Portland Bill (*extreme*) to St. Albans Head	E. ¾ S.	16
„ St. Catherine Lt.	E. by S. ½ S.	44¾
„ Cherbourg (*W. end of breakwater*)	S. by E.	59
„ Casquets Lts.	S. by W. ½ W.	48
„ Hanois Lt.	S.S.W. ½ W.	66
„ Cape de la Hague Lt.	South	51
Needles Lt. to Durlstone Head	W. ¼ N.	14
„ Shambles Lt. (passing ¼ m. outside Durlstone Head).	W. ¼ N.	29½
„ St. Catherine Lt.	S.E. ¼ S.	12½
„ Le Havre (*pier*)	S.S.E.	96
„ Cherbourg (*W. end of breakwater*)	S.S.W.	59
„ Casquets Lts.	S.W. ⅓ W.	64
„ Hanois Lt.	S.W. ½ W.	85
St. Catherine Lt. to Shambles Lt.	W. by N. ½ N.	40
„ St. Albans Head	W.N.W.	29
„ Dunnose	E. ¼ S.	5
„ Owers Lt.	E. by S.	24½
„ Beachy Head Lt.	E. by S.	60
„ Casquets Lts.	S.W. by W. ¼ W.	66
Nab Lts. to S.E. Princessa buoy	S.W. ½ W.	2⅔
„ Warner Lt.	N.W. ½ N.	3
„ Dean Tail buoy	N.E. ⅔ N.	1¼
„ Black buoy off S.W. part of Boulder bank	S.E. ¾ E.	6¼
„ Owers Lt.	S.E. ¾ E.	12¾
Beachy Head (*pitch of head*) to Owers Lt.	W. by N. (northerly)	35
„ Casquets Lts.	W. by S.	118
„ South Hd. of Royal Sovereign.	S.E. by E. ½ E.	7½
„ Dungeness Lt.	East	29½
„ Cape Gris-Nez Lt.	E. by S.	52
Dungeness Lt. to South Hd. of Royal Sovereign	W. ¾ S.	23½
„ Folkestone Lt.	N.E. by E. ¼ E.	13
„ South Foreland Lts.	E. N. E.	20½
„ Cape Gris-Nez Lt.	S.E. by E. ¾ E.	23½
„ Varne Lt.	E. by S.	11½
South Foreland Lts. to Calais Pier	S.E. ¼ S.	20½
„ Cape Gris-Nez Lt.	S. ¾ E.	18
„ Boulogne Pier	South	25½
„ Varne Lt.	S.W. ¾ S.	12¾
North Sand Head Lt. to North Foreland Lt.	N.W. ¼ N.	6
„ Kentish Knock Lt. (*revolving*).	N.N.E. ½ E.	21
„ Galloper Lts. (2 *fixed horizontal*).	N.E.	28½
Folkestone to Calais (*pier to pier*)	S.E. by E.	25½
„ Boulogne („)	S. by E. ½ E.	25½
Dover to Calais („)	S.E. ¼ E.	21½
„ Boulogne („)	S. ½ E.	25

TABLE OF POSITIONS.

Place.	Latitude.			Longitude.		
COAST OF ENGLAND.						
	°	′	″	°	′	″
Bishop Lt.-ho.	49	52	30N	6	26	36W
Seven Stones Lt.-vessel	50	3	37	6	4	37
Wolf Rock Lt.-ho.	49	56	43	5	48	27
Longships Lt.-ho.	50	4	4	5	44	44
St. Agnes Lt.-ho. (Scilly)	49	53	33	6	20	38
Lizard E. Lt-ho.	49	57	40	5	12	6
Falmouth; staircase turret of Pendennis Castle	50	8	44	5	2	45
Rame Head	50	18	42	4	13	22
Eddystone Lt.-ho.	50	10	49	4	15	53
Plymouth; dial on breakwater	50	19	59	4	8	52
,, signal staff on Mount Wise	50	22	0	4	10	15
Start Lt.-ho.	50	13	17	3	38	28
Portland, upper Lt.-ho.	50	31	18	2	27	18
Needles Lt.-ho.	50	39	40	1	35	27
St. Catherine Lt.-ho.	50	34	30	1	17	47
Portsmouth; semaphore in dockyard	50	48	3	1	5	58·5
Owers Lt.-vessel	50	38	50	0	40	0
Beachy Hd. Lt.-ho.	50	44	15	0	12	58E
Dungeness Lt.-ho.	50	54	47	0	58	18
Varne Lt.-vessel	50	56	18	1	16	20
South Foreland Lt.-houses	51	8	23	1	22	22
North Foreland Lt.-ho.	51	22	28	1	26	48
COAST OF FRANCE.						
Ushant; Lt.-ho. on N.W. extreme	48	27	34	5	7	52W
Hanois Lt.-ho. (Guernsey)	49	26	2	2	42	10
Casquets N.E. Lt.-ho.	49	43	17	2	22	42
Cape de la Hague Lt.-ho.	49	43	22	1	57	21
Cape Barfleur Lt.-ho.	49	41	50	1	16	2
Cape de la Hève Lt.-ho.	49	30	43	0	4	2E
Cape Gris-Nez Lt.-ho.	50	52	10	1	34	56

TIDE TABLE.

The *rise* of springs and neaps is *above the mean level of low water ordinary springs*, or above the soundings of the charts—the rise is about 2 to 3 ft. more at extraordinary springs. To find *range* of a neap tide (which is its rise above the mean level of low water ordinary neaps), take spring rise from double neap rise.

If the tidal stream is marked 3 knots on the chart, and it be springs,—at 1st hour allow 1 knot, 2nd hour 2 knots, 3rd hour 3 knots, 4th hour 2 knots, 5th hour 1 knot. Take one-third from each of these quantities if it be neaps.

As a rough general rule, a vessel in the Channel fairway will be carried in one whole tide about 9 m. at springs, about 6 m. at neaps; the rates will increase nearer the land.

For second high waters in Solent and as far W. as Portland, see foot note p. 93.

Place.	High Water F. & C.	Rise.	
		Sps.	Nps.
	h. m.	ft.	ft.
Scilly (St. Agnes)	4 30	16	12
Longships	4 35	20	14
Mounts bay	4 30	16	12½
Lizard	5 0	14¼	10½
Falmouth harbour	4 57	16	12
Truro (town quay)	5 5	10	6
Mevagissey	5 4	15½	12
Fowey	5 14	15	11¾
East Looe	5 26	16	13
Plymouth breakwater	5 37	15½	11½
River Tamar			
„ Saltash	5 45	15	11
„ Cargreen	5 47	14¾	10¾
„ Pentillie	5 55	13½	9½
„ Calstock	6 6	12½	8½
„ Morwellham	6 12	10½	6½
„ Weir head	6 17	5¼	1¼
River Tavey			
„ Warleigh quay	5 47	14½	10½
„ Maristow	5 47	8½	4½
Bigbury bay			
„ River Yealm	5 37	16¼	11½
„ „ Erme	5 40	11	6¼
„ „ Avon	5 47	11	6¼
Bolt Head	5 45	15	11
Salcombe harbour	5 41	15	11½
Eddystone	5 15	16	12
Start	5 41	15	11½
Dartmouth harbour	6 16	14¼	10½
Teignmouth	6 0	13	9½
Torbay	6 0	13½	10
Exmouth	6 21	12¼	8½
Lyme Regis harbour	6 21	14	11
Bridport harbour	6 5	11¼	7¾
West bay	6 13	10¼	7
Portland Bill	6 35	9	6½
„ breakwater	7 1	6¾	4½
Poole harbour	9 10	6½	4¾
	12 45		

Place.	High Water F. & C.	Rise.	
		Sps.	Nps.
	h. m.	ft.	ft.
Christchurch harbour	9 0	5	—
	11 30		
Needles Pt.	9 46	7½	5
Hurst	10 0	7½	6
	12 0		
Yarmouth	10 0	7	6½
	12 0		
Lymington river	10 25	8	6
	12 15		
Cowes harbour	10 45	12½	9½
	11 45		
Ryde pier	11 20	13½	10
Calshot pt.	11 30	13	9½
Southampton	10 30	13	9½
	12 45		
Portsmouth:			
„ Dockyard	11 41	12½	10
„ Porchester	11 46	13	10¼
„ Fareham upper quay	11 47	11¼	8½
„ Fareham bridge	11 51	7½	4¾
Spithead anchorage	11 20	13¾	10
Langston harbour	11 40	13½	10½
Chichester „	11 30	14	11
Pagham (entrance)	11 30	16½	12½
Selsea Bill	11 45	16½	12½
Little Hampton	11 36	16	11½
Arundel (bar)	11 35	16	11½
„ (town)	12 25	16	11½
Shoreham harbour	11 34	18	13¼
Brighton	11 15	19¾	16
Newhaven harbour	11 51	20	15
Beachy Head	11 20	20	15
Eastbourne	11 3	21¼	17
Hastings	10 53	24	17½
Rye bay	11 20	22	17¼
Dungeness	10 45	21¾	19
Folkestone harbour	11 7	20	16½
Dover harbour	11 12	18¾	15
Deal	11 15	16	12½
Ramsgate harbour	11 44	15	12

TO CONVERT POINTS OF THE COMPASS, AND THEIR FRACTIONAL PARTS, INTO DEGREES, &c.

Points.	Parts.	Degrees, &c.			Points.	Parts.	Degrees, &c.		
		°	′	″			°	′	″
North or South	0	0	0	0	N.E. or N.W. / S.E. or S.W.	4	45	0	0
	1/8	1	24	22		1/8	46	24	22
	1/4	2	48	45		1/4	47	48	45
	1/3	3	45	0		1/3	48	45	0
	3/8	4	13	7		3/8	49	13	7
	1/2	5	37	30		1/2	50	37	30
	5/8	7	1	52		5/8	52	1	52
	2/3	7	30	0		2/3	52	30	0
	3/4	8	26	15		3/4	53	26	15
	7/8	9	50	37		7/8	54	50	37
N. by E. or N. by W. / S. by E. or S. by W.	1	11	15	0	N.E. by E. or N.W. by W. / S.E. by E. or S.W. by W.	5	56	15	0
	1/8	12	39	22		1/8	57	39	22
	1/4	14	3	45		1/4	59	3	45
	1/3	15	0	0		1/3	60	0	0
	3/8	15	28	7		3/8	60	28	7
	1/2	16	52	30		1/2	61	52	30
	5/8	18	16	52		5/8	63	16	52
	2/3	18	45	0		2/3	63	45	0
	3/4	19	41	15		3/4	64	41	15
	7/8	21	5	37		7/8	66	5	37
N.N.E. or N.N.W. / S.S.E. or S.S.W.	2	22	30	0	E.N.E. or W.N.W. / E.S.E. or W.S.W.	6	67	30	0
	1/8	23	54	22		1/8	68	54	22
	1/4	25	18	45		1/4	70	18	45
	1/3	26	15	0		1/3	71	15	0
	3/8	26	43	7		3/8	71	43	7
	1/2	28	7	30		1/2	73	7	30
	5/8	29	31	52		5/8	74	31	52
	2/3	30	0	0		2/3	75	0	0
	3/4	30	55	15		3/4	75	56	15
	7/8	32	20	37		7/8	77	20	37
N.E. by N. or N.W. by N. / S.E. by S. or S.W. by S.	3	33	45	0	E. by N. or W. by N. / E. by S. or W. by S.	7	78	45	0
	1/8	35	9	22		1/8	80	9	22
	1/4	36	33	45		1/4	81	33	45
	1/3	37	30	0		1/3	82	30	0
	3/8	37	58	7		3/8	82	58	7
	1/2	39	22	30		1/2	84	22	30
	5/8	40	46	52		5/8	85	46	52
	2/3	41	15	0		2/3	86	15	0
	3/4	42	11	15		3/4	87	11	15
	7/8	43	35	37		7/8	88	35	37
N.E. or N.W. / S.E. or S.W.	4	45	0	0	East or West	8	90	0	0

WINDS AND WEATHER.

The prevailing winds in the English Channel are from the western quarter. Westerly gales are felt at all seasons, hut they are more frequent from Novemher to Mareh inelusive. Of these, a S.W. gale is eonsidered to be the most dangerous, for it sometimes suddenly veers to N.W., North, and even to N.E., without losing its strength, and causes in a few hours a heavy sea on the Freneh eoast.

It has been notieed that those gales that oeeur during springs are more violent and last longer than those that take plaee during neaps.

Gales from the N.E. are also violent, hut the wind does not shift as it does with those from the westward. They eause a heavy sea on the flood stream,

S.E. winds, aeeompanied hy rain, are often violent, and almost always turn into gales, during whieh the wind in squalls flies quiekly round to North and N.W., making it then dangerous to he caught on the Freneh coast. Moderate winds from N.W. to N.E. bring fine weather.

Dead calms are of rare oeeurrence. Fogs are frequent.

The wind usually veers or goes round *with the sun* (right handed in northern parts of the world; left-handed in southern parts); and when it does not do so, or backs, more wind or bad weather may be expeeted, instead of improvement.

With your face towards tho wind, in North latitude, the eentre of the eireling or rotatory storm will he square to your right. In South latitude, square to your left.

WEATHER WISDOM.

Continued comparisons of changes of weather or wind during many conseeutive years, in various parts of the world, have proved deeidedly that *there is no regular correspondence* hetween the *lunar phases* and *atmospherical changes*.

The sooner a ehange (for fair or foul) follows the fall or rise of tho weather-glass whieh presaged it, the less time will sueh weather usually last: and, on the contrary, the longer the time hetween the signs and the weather foretold, the longer will sueh altered weather last. The thermometer is of less importance as a weather prophet than the barometer. But when it rises rapidly and unseasonahly, S.W. winds and rain may be expeeted; and a fall, on the other haud, indicates N.E. winds and dry weather.

Among the signs drawn from ohservation of the sky, the most valuable are two, viz. that a rosy (not a deep red) sky at sunset presages fine weather; while a red morning sky indieates mueh rain or wind. Gray is tho most favourable eolour for the early morning sky, espeeially if the day breaks first on the horizon. A bright yellow sunset presages wind; a pale yellow rain. A gloomy dark blue sky is a sign of wind; while a light hlue sky is the strongest sign of fine weather. The sun's setting or rising behind a hank of elouds indieates rough weather; so do ragged, hard-edged, or tufted clouds; hut soft, delieate elouds, remaining nearly stationary, show fine calm weather. When clouds high up are seen hlowing in a direction different from the lower elouds, or from the wind felt below, a change of wind, in the direetion of the upper stratum, will prohably oeeur.

The hahits and instinets of animals should also be noticed hy whoever desires to he weatherwise. Thus, leeches, when kept in water, remain low down in settled weather, but rise to the surfaee when wind or rain is impending: and when land hirds keep near their homes, sea birds do not go out to sea, animals seek sheltered places, smoke from ehimneys does not aseend straight upward during a calm, and pigs carry straw to their sties, had weather may be looked for.

Dew and fog are indieations of fine settled weather; but great elearness of the air and unusual refraetion presages wind, if not rain also. As to the duration of weather, it may be said generally that westerly winds do not hring lasting weather of any kind; while that aecompanying easterly currents has more tendency to be permanent.

BAROMETER READINGS: USEFUL RULES.

In endeavouring to foretell weather, the general peculiarity should always be remembered, that the barometric column usually stands higher with easterly than it does with westerly winds; and with winds from the polar regions higher than with those from the direction of the equator. Hence the highest columns are observed with north-east winds in northern latitudes, and with south-east in the southern hemisphere. In middle latitudes there is an average difference (unreduced or observed height as read off) of about half an inch, other things being similar, between the heights of the mercury with north-easterly or with south-westerly winds. The more gradually the column moves the more settled in character will the weather be, and conversely.

A RISING BAROMETER.

A *rapid* rise indicates unsettled weather. A *gradual* rise indicates settled weather.

A *rise*, with dry air and cold increasing in summer, indicates wind from northward; and if rain has fallen better weather is to be expected.

A *rise* with moist air and a low temperature, indicates wind and rain from northward.

A *rise* with southerly wind, indicates fine weather.

A STEADY BAROMETER,

With dry air and a seasonable temperature, indicates a continuance of fine weather.

A FALLING BAROMETER.

A *rapid* fall indicates stormy weather.

A *rapid* fall, with westerly wind, indicates stormy weather from northward.

A *fall* with a northerly wind, indicates storm, with rain and hail in summer and snow in winter.

A *fall* with increased moisture in the air and the heat increasing, indicates wind and rain from southward.

A *fall* with dry air and cold increasing in winter, indicates snow.

A *fall* after very calm and warm weather, indicates rain, with squally weather.

The most dangerous shifts of wind and the heaviest northerly gales happen after the mercury first rises from a very low point.

The tides are affected by atmospheric pressure, so much that a rise of one inch in the barometer will have a corresponding fall in the tides of 9 to 16 inches, or say one foot for each inch.

SEAMEN'S PROVERBS.

The Barometer.

Long foretold long last,—short notice soon past.

First rise after very low,—foretolls stronger blow.

When the glass falls low, prepare for a blow; When it rises high let all your kites fly.

At sea with low and falling glass, soundly sleeps a careless ass.
Only while it's high and rising, truly rests a careful wise one.

Winds and Weather.

A red sky in the morning, sailors take warning; A red sky at night is a sailor's delight.

The evening red and morning gray, are sure signs of a fine day;
But the evening gray and morning red, make the sailor shake his head.

When rain comes before wind,—halyards, sheets, and braces mind.
When wind comes before rain,—soon you may make sail again.

He who strives the tempest to disarm, must never first embrail the lee yardarm.

Relating to Hurricane Months in the West Indies.

June, too soon. July, stand by. August, look out you must. September, remember.
October, all over.

ABBREVIATIONS used in this work:—ch., church—E., east—fms., fathoms—F. & C., full and change—Hd., head—ho., house—H.W., high water—Id., island—kts., knots—Lt., light—Lt.-ho., lighthouse—Lt.-vessel, light-vessel—L.W., low water—m., mile—N., north—nps., neaps—p. page—Pt., point—sps., springs—S., south—W., west—yds., yards.

All BEARINGS are Magnetic, and the DISTANCES are in Sea miles. A CABLE'S LENGTH is assumed to be equal to 100 fms., or the $\frac{1}{10}$ part of a Mile. The SOUNDINGS in this Work and on the Charts are the mean of L.W. of Ordinary Sps.: they are about 2 ft. less at Extraordinary Sps.

BUOYAGE:—The leading principles of the system of Buoyage adopted since 1860 by the Trinity Board are, that the Starboard side of Channels *entering* will be marked by Black or Red Buoys *only*, and the Port side by Black or Red Buoys Chequered, or Striped Vertically with White. Middle Grounds will be marked by Black or Red Buoys with White Bands or Horizontal Stripes. It is to be observed that only *one colour*, either Black or Red, will be used in the *same* Channel. When Beacons are considered necessary to be placed on Buoys, the Starboard side *entering*, will be distinguished by Globes, the Port side, *entering*, by Cages; and Middle Grounds by Triangles or Diamonds.

LIFEBOATS are stationed at Sennen Cove, Penzance, Porthleven, Mullion, Lizard, Cadgwith, Porthoustock, Falmouth, Mevagissey, Fowey, Looe, Plymouth, Salcombe, Brixham, Teignmouth, Exmouth, Sidmouth, Lyme Regis, Weymouth, Kimeridge, Chapman's Pool, Poole, Isle of Wight (at Brook Chine, Brightstone Grange, and Bembridge), Chichester harbour, Hayling island, Isle of Purbeck, Selsea Bill, Worthing, Shoreham, Brighton, Newhaven, Eastbourne, Hastings, Winchelsea, Rye, Camber, Dungeness, Dover, Kingsdowne, Walmer, North Deal, Ramsgate, and Broadstairs.

CHARTS.—The following Admiralty charts will be useful when studying the Pilotage of the English Channel. They may be obtained from J. D. Potter, No. 31 Poultry, and No. 11 King St., Tower Hill, London, or any other respectable chart seller:—

English Channel, No. 1,598—England, South Coast, Sheet 1, No. 2,565—Approaches to Falmouth, No. 154—Plymouth Sound and Hamoaze, No. 30—Bill of Portland, Portland Roads, &c., No. 2,255—Needles, No. 2,219—Owers to Christchurch, including Spithead, No. 2,045—Spithead, No. 2,050—Dover Strait, Coast of England, Sheet 7, No. 1,895—the Downs, No. 1,828.

THE PILOT'S HANDBOOK

FOR THE

ENGLISH CHANNEL.

For the convenience of officers wishing to qualify themselves for GENERAL CHANNEL PILOTS, that portion of the work which especially belongs to LOCAL PILOTAGE, is marked at the SIDE OF THE PAGE by a BLACK LINE.

ENTERING the CHANNEL.—When about entering the English Channel, take advantage of every glimpse of the sun, moon, or stars, to ascertain the ship's real position. If unable to do this, take more than ordinary pains in revising the dead reckoning, and then, after reviewing the state of the wind and water for several previous days, make the best allowance for the apparent set of the swell, for the action of any cross sea, and for the influence of any probable current.

Be not, however, too confident that because a gale has been blowing from the W., a current is setting E. into the Channel; for it has been clearly shown that in certain cases the long ocean swell rolled by W. gales into the Bay of Biscay accumulates there so as to form in the *cod* of that Bay a head of water, which cannot return W. along the Spanish shore (being met by the incoming swell), and therefore pours itself to the N.W. along the French coast, thus forming a temporary but decided current, *obliquely* traversing the line of the Channel entrance, and occasionally extending beyond the S.W. angle of Ireland. This is not of frequent occurrence, but a vessel without the means of correcting her latitude may be swept by it N. of Scilly in the course of a night.

Attend also strictly to the deviation of the compass, as neglecting to apply it may—especially in iron vessels—cause great error in the latitude; and as in the majority of cases the deviation on the Channel course is easterly, the error would lead a vessel S. of her supposed position, and of course in the most dangerous direction if she is entering the Channel on a southern parallel.

BEST PARALLEL for ENTERING.—Bound into the Channel either from the S. or W., if *certain* of the vessel's position, a direct course may be shaped for the Lizard or Start; but with *uncertain* reckoning, the *Log, Lead, Look-out,* and *Quality of Ground* are the only guides. In the latter case (the latitude being generally obtainable to within a few miles), steer for the edge of soundings between the parallels 49° 15′ and 49° 30′ N. By carrying a *con-*

tinuous line of soundings between these parallels, will give the position pretty accurately, at all events sufficient to guard against danger.

S. of parallel of 49° 15′ N., and E. of 10° W., the bottom is sand, until nearing Ushant, when it becomes pale yellow ground, resembling hardish marl, with a mealy surface; near Ushant it is coarse gravel, with rocky substances, which continues along the N. coast of France. The bottom N. of 49° 30′ is oaze (soft slimy mud), until within 18 m. of Scilly, when it is fine or coarse sand, which becomes coarser and darker, mixed with small stones, as Scilly is approached; but in this latter space there is no oaze.

As a general rule, therefore, in thick weather, and with uncertain reckoning, when bound from the S.W., run northward when the vessel is E. of 10° W., until oaze forms part of the soundings; and when bound from the N.W. run southward when E. of 10° W. until the soundings are *free* from oaze.

Between the above parallels, the outer edge of soundings, 335 to 270 fms., sand and oaze, is in 11° 28′ W. At 25 m. E. of this is 100 fms., and 25 m. farther E. the depths decrease suddenly to 75 and 69 fms., fine sand and shingle; they then deepen, the bottom being sand and oaze, to 9° 10′ W. From hence to 7° 15′ W., the bottom will be clean sand if the vessel is S. of 49° 15′; sand and oaze if between 49° 15′ and 49° 30′; and oaze if N. of 49° 30′.

From 7° 15′ W. the bottom will be sand to the meridian of Scilly (which will be then distant about 30 m.), where the depths are 60 to 67 fms., coarse sand and shells. The course now to pass 10 m. S. of the Lizard is E. ¼ N., the water shoaling gradually, 65 to 47 fms., sand and shells.

Between W. by S. and S. by E., distant 15 to 20 m. from the Lizard, the depths are 51 to 45 fms., gradually shoaling to the Lizard, 3½ miles from which are 40 fms. In thick weather do not approach nearer to Scilly than 55 fms. water, nor to the Wolf and Lizard than 45 fms.

On PARALLEL of SCILLY the bottom will be oaze mixed with sand until within 18 m. of St. Agnes, when it will be fine or coarse pale white mixed sand, becoming coarser and darker, mixed with small stones and pieces of shells, as the islands are approached, but there will be *no oaze*. Within this distance, and between S. by W. and N.N.W. from St. Agnes, the depths will be 60 to 55 fms., gradually decreasing to 45 fms., which is *close* to the rocks.

On PARALLEL of USHANT, from 8° W. to about 9 m. of the island, the soundings decrease gradually from 88 to 65 fms., coarse pale yellow ground, resembling hardish marl, with a mealy surface, mixed with broken shells; but on nearing Ushant the bottom will be coarse gravel, with rocky substances, which continues all along the French coast.

USHANT, lying W. ¾ N. 10½ m. from the N.W. extreme of the French coast, is 195 feet high, and visible in clear weather at 15 m. Its outline is rugged and uneven, being composed of high, craggy, and precipitous rocky cliffs. A Lt.-ho. 85 feet high (*fixed* Lt.) stands on its N.E. extreme, and another 154 ft. high (*revolving* Lt.) on its N.W. extreme (see page 105). In thick weather do not shoal towards it to less than 70 fms.

RUNNING UP CHANNEL.

LIZARD to START, E. ⅔ S. 63 m.—Steam-vessels from the Mediterranean and Portugal generally endeavour to sight Ushant, and from thence steer for the Start or Portland; but it would be prudent for sailing vessels to get into Fairway of Channel, and then keep between 12 and 24 m. from English coast, so that, should the wind suddenly shift, they may be enabled to gain an English port, instead of being on the French shore, in the midst of dangers, without a place of refuge, irregular soundings, and strong tides.

By not standing into less than 40 fms. a vessel will pass upwards of 5 m. S. of Eddystone, in the stream of which are 34 to 37 fms. Lizard Lts. kept W. ¾ N. until St. Anthonys Lt. bears N.N.E. clears Manacles. Lizard Lts. kept just open of Beast Pt. about W. ¼ N., lead direct to Eddystone.

START to ST. CATHERINE PT., E. ¾ S. 92 m.—Start to Bill of Portland East 49 m.—From 4 m. S. of Bill to Needles Lt. (allow for tide), an E. ¼ N. course for 34 m. will pass 2 m. outside Shambles, nearly 2 m. outside St. Albans Hd., and 1½ m. outside Durlston Hd.

When eastward of a line joining Start to Casquets, a vessel will be in the W. Channel stream (see p. 91), which will carry her towards Beachy Hd. while the water is rising at Dover, and away from it while it is falling there.

Between Needles and St. Catherine Pt. do not shoal at night to less than 15 or 16 fms., keeping Needles *red* Lt. in sight, or in a large ship not bringing it west of N.W. by N. After losing sight of Needles Lt. do not shoal to less than 16 or 17 fms. until St. Catherine Lt. is N.E., when, if bound to Spithead, haul to the E. to sight Nab Lts. (see pp. 46 and 60).

Guard against the *indraught*, both on flood and ebb, into all the deep bights between Portland and the Owers, particularly on the flood. A vessel will not be much affected by it on either tide, if she keeps outside Shambles, 1½ m. off St. Albans Hd., 2 m. off St. Catherine Pt., and 4 or 5 m. S. of Owers.

ST. CATHERINE PT. to BEACHY HD.—From 4 m. S. of St. Catherine Pt. to a similar position off Beachy Hd., E. by S. 60 m. This will pass 4 m. S. of Owers, and the vessel will not be affected by the indraught. Nab and Warner Lts. in line, N.W. ½ N., lead 1½ m. S.W. of Boulder bank buoy; and (after losing sight of Warner Lt.) Nab Lts. *kept* on that bearing will lead 3 m. S.W. of Owers Lt. Standing towards S. side of Owers, do not bring Owers Lt. S. of S.E. by ½ E., nor Nab Lts. W. of N.W. Standing towards E. side of Owers, do not bring Owers Lt. S. of S.W.

BEACHY HD. to DUNGENESS.—From 1 m. S. of South Hd. of Royal Sovereign shoals to 1 m. S. of Dungeness Lt., E. by N. 23½ m. To pass 2 m. S. of the South Hd. keep Seaford cliff just in sight of the pitch of Beachy Hd. N.W. ¾ W., until the two high *white* mills (seldom seen) at Battle come in line with the town of Bexhill, N.N.E., or Royal Sovereign buoy bears N., when haul up about E. by N. for Dungeness. At *night* keep Beachy Hd. Lt. N.W. ¾ W., or just in sight of the pitch of the Hd.; this will lead about 1 m. S. of

the South Hd., and having run about 10 m. distance from the Lt. (allow for tide),* haul up E. by N. for Dungeness.

The vessel thus far has been in the W. Channel stream, which has turned with the rising and falling water at Dover. In Dover Strait, however, between Beachy Hd. and N. Foreland, she will be influenced by both W. and E. Channel streams, which meet at Beachy Hd. when the water at Dover begins to rise, and separate at Beachy Hd. when it begins to fall (page 92).

DUNGENESS to DOWNS.—Dungeness to S. Foreland E.N.E. 20½ m. 12 fms. water is a safe depth to stand into between Dungeness and S. Foreland. Standing off shore do not shoal to less than 17 fms. towards Ridge, nor 16 fms. towards Varne. There is 8 fms. at ¼ m. off S. Foreland, 10 fms. at ½ m., 14 fms. at 1 m. Having rounded it at the latter distance, when the S. Foreland Lt.-houses are in line, W. ¾ N., or when the houses at Deal come in sight, steer N.N.E. ½ E. for the Downs. Rounding the S. Foreland in thick weather do not shoal to less than 11 fms., nor deepen to more than 14 fms., for 18 to 20 fms. will take the vessel E. of Goodwin.

At *night* when Dungeness Lt. bears N.W. ½ N., the vessel will be on the line of S.W. extreme of Ridge, and may stand towards that shoal till Varne Lt. bears N.N.E. ½ E. When N. of Varne Lt. she may stand towards Varne till Varne Lt. bears S.W. ¾ W. When S. Foreland Lts. bear N.N.E, and Dungeness Lt. (seen from the rigging) bears W., she will be N. of Varne, and close to Varne buoy.

WORKING DOWN CHANNEL.

When beating up or down Channel, the seaman should make himself thoroughly acquainted with the turn and direction of the streams (page 91 and table at page 94), and particularly their meeting and separation in Dover Strait (page 93, and plates 15, 16, 17).

Inshore between Hythe and Dungeness, there is a slack during the strength of E. stream; and the tide is easy from Hastings to Beachy Hd. During W. stream the tide is easy between Hythe and Sandgate, as far as Mill Pt.; and there is a slack between Dungeness and Fairlight.

Between Beachy Hd. and the Start the Channel stream runs to the E. while the water is rising at Dover, and to the W. while it is falling there. To the W. of the Start is the Outer stream which sets in an opposite direction (at the same time) to the Channel stream. The stream at the mouth of the Channel, although influenced by indraught and outset, will be found running to the

* If a Lt.-vessel (say a *green* Lt.) were placed near the South Hd. of Royal Sovereign shoals, it would not only mark that danger to large ships, but would give a *cross bearing;* for with a strong W. wind and E. stream running, it is sometimes difficult to estimate the distance when to haul up for Dungeness Lt., and instead of making that Lt. right ahead, it is more often made abeam or broad on the port bow (in hazy weather not at all); or the vessel finds herself in dangerous proximity to the Varne or Ridge shoals or to the French coast.—J. W. King, *Master of H.M. flag-ship, Vernon*, 1848.

N. and E. while the water is falling at Dover, and to the S. and W. while it is rising there.

The stream turns from 1 h. to 2 h. earlier in the bights of the coast than in the offing. (For Spithead tides, see page 93.)

DOWNS to DUNGENESS.—Weighing from the Downs, a vessel may stand towards Deal to 7 fms., or tack before E. Bottom semaphore comes on with S. cliff of Old Stairs bay, S.W. ½ S. Do not shoal towards Goodwin to less than 11 fms., or till S. Sand Hd. Lt. bears S.W. ½ S.; 8 fms. towards Walmer; 11 fms. towards S. Foreland.

12 fms. is a safe depth to stand into between S. Foreland and Dungeness. Between Eastware bay and Hythe go about directly S. Foreland Lts. are shut in by Shakspeare cliff, E. by N.; off Folkestone put the helm down when the high Lt. disappears.* Dungeness Lt.-ho. S.W. by W. ¼ W. (at night the Lt. will begin to show *red* on this bearing), or Beachborough summer ho. on with Hythe ch. N.E. by N., leads outside Swallow and Newcombe banks.

Standing off shore, the Varne may be approached to 16 fms., or until Varne Lt. bears S.W. ¾ W.; the Ridge to 17 fms., or until Varne Lt. is N.N.E. ½ E. The S. Foreland Lts. N.E. ½ N. lead 1½ m. westward of Varne and 2½ m. from Ridge. Dungeness Lt. N.W. ¾ N. leads S. of Ridge.

DUNGENESS to BEACHY HD.—Dungeness is bold-to (see foot-note, page 79), there being 16 fms. at 1½ cables from the beach. In thick weather 15 fms. is a safe depth to stand inshore between Dungeness and Beachy Hd. In fine weather Stephenson shoal may be approached to 10 fms., or until Dungeness Lt. is E. by N. ½ N.; from thence to abreast Bexhill to 9 fms.; between Bexhill and Beachy Hd. to 15 fms.

S. Foreland and Dungeness Lts. in Line E.N.E., lead ¾ m. outside Stephenson shoal The two high white mills at Battle in line with the town of Bexhill N.N.E., lead 1½ m. E. of South Hd. of Royal Sovereign shoals. Beachy Hd. Lt. just in sight of pitch of Beachy Hd. N.W. ¾ W., leads 1 m. S. of South Hd.

From about ½ m. off Dungeness, the course is W. by S. (but not more westerly), and when Beachy Hd. Lt. or Seaford cliff opens out, a W. ½ N. course can be shaped down Channel.

Standing off shore, a vessel must be *guided* throughout the *whole length* of the Channel by the *bearings* of the Lts., and the *soundings* on the Chart.

BEACHY HD. to ST. CATHERINE PT.—Do not shoal at night or in thick weather to less than 10 fms. between Beachy Hd. and Littlehampton; 20 fms. towards Owers; 18 fms. between Owers and Dunnose (10 fms. in fine weather); and 25 fms. towards Dunnose and St Catherine Pt., which are steep-to. When E. of Owers Lt. do not bring it S. of S.W.; and when W. of Lt. do not bring it S. of S.E. by E. ½ E., or Nab Lights W. of N.W.

Between Owers and Dunnose, by not shoaling to less than 10 fms. at L.W.

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* Small vessels standing towards the rocky ledges extending off Folkestone, must keep Folkestone *green* Lt. in sight (see page 81).

will clear all danger, so long as Nab Lights are N. of N.E. by N. ; after which keep St. Catherine Lt. in sight. This Lt. will not be visible west of W. by N.

ST. CATHERINE PT. to START.—By not shoaling to less than 20 fms. between St. Catherine Pt. and Portland, will avoid the *indraught* on the flood towards Freshwater bay, the Needles, and Christchurch bay. A vessel may stand into 16 fms. between St. Catherine Pt and Needles, but should not lose sight of Needles *red* light, not bringing it west of N.W. by N. 20 fms. in fine, or 30 fms. in thick weather, will keep her outside Portland race and Shambles. In clear weather she may stand into 17 or 16 fms. in the bight between Portland and Berry Head., and into 25 fms. from thence to Start; but in thick weather do not shoal to less than 30 fms. between Portland and Start.

To clear Skerries, keep Berry Hd. open of Downend Pt., N.E. $\frac{1}{4}$ N., till Praul Pt. opens of Start, W. $\frac{1}{4}$ N.

It may be as well to mention here, that if a vessel standing off shore should suddenly deepen from 40 to 60 fms., she will be in the stream of Casquets, or near it, either in Melville Pit or in S.W. part of Hurds Deep; or if from 45 to 70, 80, or 95 fms., she will be in N. part of Hurds Deep, and should haul at once to the north. The S.W. part of this deep is 37 m. W. $\frac{1}{2}$ N. from Casquets; the Deep then trends round their N. side, and nearly as far E. as the meridian of Cape de la Hague.

Melville Pit is a hole of small extent, with 62 fms. in it, lying 33 m. W.N.W. from Casquets.

START to SCILLY.—In thick weather do not shoal to less than 40 fms. between Start and Lizard, 45 fms. towards Lizard and Wolf, and 55 fms. towards Scilly.

The shore between Start and Plymouth is safe to approach to a mile; but take care not to be embayed there in a S.W. gale. Bearings of Eddystone will clear Hand Deeps and East Rutts (page 20). Lizard Lts. W. $\frac{3}{4}$ N., or St. Anthonys *revolving* Lt. N.N.E., or the *fixed* Lt. kept between N.N.E. $\frac{1}{2}$ E. and N. by E. $\frac{1}{4}$ E., clears the Manacles. Godolphin hill open of Pradanack point N. $\frac{1}{4}$ W., until Lowland point opens E. of Black Hd., N.E. by E. clears all dangers off Lizard. When standing towards Runnel Stone and Brisons do not lose sight of, or stand eastward of the limits of Longships *white* Lt. (see foot-note page 9).

A sailing vessel on clearing the English Channel *should at once* make her westing, as the prevailing winds are from that quarter. From the Lizard with a fair wind, a W.S.W. course should be steered to gain an offing in long. 10° or 12° W., so as to enable her to weather Ushant should the wind become adverse. If the wind veers to the westward, the vessel should be hauled to the wind on the tack which will best enable her to approach her proper course without drawing her into the Bay of Biscay, which is especially to be avoided. Rather than run any risk, it will be better to make a long board to the west-

ward at some loss of ground, since westerly winds generally veer to the N.W., and if a good offing has been made in that direction, the ship's course can afterwards be pursued a point or two free.

SCILLY ISLANDS TO LIZARD.

VARIATION, 22° 5′ TO 21° 35′ W.

SCILLY ISLANDS possess several harbours for vessels that can take the ground, and one, St. Mary's Road, for large vessels, but none of them should be taken by a stranger without a pilot, whose attendance may be depended on, even in the worst weather, as soon as the pilot signal is made. St. Marys Road shelters except from winds between W.N.W. and S.W.; these send in a heavy fetch, but vessels of moderate draught can always run to sea over Crow bar at high tide. There is 21 ft. on bar at H.W. sps.

LANDMARKS.—The white Lt.-ho. on Bishop rock shows a *fixed white* Lt. The white Lt.-ho. on summit of St. Agnes (the S. island) shows a *revolving white* Lt. (see p. 96). A stone Daymark, in form of a *cone*, 38 ft. high (its base 145 ft. above the sea), and painted in *red* and *white horizontal* bands, stands on E. end of St. Martins. A telegraph tower, windmill, fort, and *Shipping Gazette* signal tower,* will be seen on St. Marys In clear weather the islands are visible 15 m. off.

DIRECTIONS.—Both Broad Sound and North Channel are dangerous to strangers. There are several entrances to St. Marys Road, for which see Admiralty chart of Scilly Islands. The S.E. shores of St. Agnes, St. Marys, and Menewethan may be approached to ½ m., as there are no dangers *without* that distance.

To enter by **St. Marys Sound,** the Great Minalto rock on with N.E. side of Mincarlo rock, N.N.W. ½ W., leads in fair-way, leaving Woolpack rock to the E., and Little, Spanish, and Bartholomew ledges to the W. Peninnis Hd., the S. extreme of St. Marys, is bold-to. When the Daymark on St. Martins comes on with Greeb rock, N.E. by E. ¾ E., steer direct for the Road. The best berth for large ships is in 8½ fms., sand, with the Daymark in line with Cruthers Pt., E. by N. ¾ N., and Maiden Bower Id. on with N.W. extreme of White Id., N.N.W. ¾ W. The inner anchorage is in 6 fms., sand, with the Daymark on with Cruthers Pt., and St. Mary's ch. in line with the new pier

* **Signal Stations.**—The *Shipping Gazette* signal tower, with flagstaff, stands on Peninnis Hd., the S. extreme of St. Marys. There are also other signal stations at Penzance, Beast Pt., Prawle Pt., St. Catherine Pt., South Yarmouth, Dungeness, Dover, Deal, and Broadstairs, at all of which vessels of any nation making their names by the International (Commercial) Code of Signals, in passing the Stations, are promptly reported in the *Shipping Gazette*, and to the Owners if required. (See foot-note, p. 13.)

end, S.S.E. ½ E. Coasters anchor in shoaler water near Nut rock. If moored have open hawse to the W.

Gilstone rock, lying ½ m. E. by S. from Peninnis Hd., covers at ¾ flood. Pollard rock dries 7 ft. at L.W. Woolpack rock has on it an iron *beacon* with cage on top, and dries a little before L.W. Trisky shoal has 3¼ fms. on it, and the Woodcock only 8 ft. Stevel rock is bold-to. Little ledgo has 7 ft. on it. Spanish and Bartholomew ledges have rocky hds. which dry at very low sps. Spanish ledge is marked by a *black* and *white vertically striped* conical buoy, in 6 fms., Woolpack beacon bearing N. ¾ W., ½ m. Bartholomew ledge is marked by a *similar buoy* in 7 fms., Spanish ledge buoy bearing S.S.E. ½ E., $\frac{7}{10}$ m., and Woolpack beacon S.E. by E. ¼ E., ¼ m. Wetnose rock has 3¾ fms. on it, and Perconger ledge 7 ft. Round rock covers at 4 ft. flood.

To enter by **Broad Sound,** run in between the Bishop and Crim rocks, keeping nearer the Bishop. Rocks with only 3 to 6 ft. over them extend 1½ cables between N. and E. from the Bishop. The leading mark then is Nornour island its apparent length open of Bants Carn Pt., E. ¾ N., leaving the Gunner, Southward, and Jeffry ledges to the N., and the Old Wreck to the S.; then steer for St. Marys Road. Old Wreck is marked by a *black* conical buoy in 7 fms., from which St. Agnes Lt.-ho. bears S.E. ¼ S., 1½ m., Bishop Rock Lt.-ho. W. by S. ¼ S., $3\frac{1}{10}$ m., and Crow beacon, E. by N., 3½ m. Southward ledge has only 1 ft. on it; the Jeffry 2 ft.; Old Wreck 3 ft.; and Scar 4 fms.

To enter by **North Channel,** steer in with St. Agnes Lt.-ho. on with S. side of Great Smith rock, S.S.E. ¼ E., till the leading mark through Broad Sound comes on as above. Le Steeple has only 1 ft. on it; the Carn Base 2 ft.

It is H.W., F. & C., at St. Agnes at 4 h. 30 m.; the tide flows 1 h. longer with strong S. winds, and 1 h. earlier with strong N. winds. At 6 m. S. of the islands the streams set E. and W. for equal spaces of time, but among the islands and rocks they are subject to a variety of inflexions. For direction of tidal streams, see arrows on Chart of Scilly Islands.

SEVEN STONES, lying in the fair-way between Scilly and Lands End are a dangerous rocky cluster, about 1 m. in extent, N. and S., and steep-to, having 38 and 40 fms. all around at 1 m. from the rocks. The two principal rocks are Pollard and South Stone. Pollard (the N.W. rock) appears at ½ ebb. South Stone lies ⅔ m. S. by E. ¾ E. from Pollard, and uncovers at 5 h. ebb. Several sunken rocks lie from N.E. by E. to S.S.E., 2 to 4 cables distant from Pollard, and 1 cable from S.W. to W. of South Stone. The breakers may be seen from a considerable distance.

A *Lt.-vessel* with 2 masts (a *fixed white* light on each mast), is moored in 42 fms., distant 2 m. E. ½ N. from Pollard, and 2 m. N.E. by E. ¾ E. from South Stone (see p. 96).

Marks.—From the Pollard, the Daymark on St. Martins bears W. by S. ½ S., 7 m., and Longships Lt.-ho. E. by S. ½ S., 14½ m. The Telegraph on St. Marys just showing N. of Daymark on St. Martins S.W. ¾ W., leads 2¼ m. N. of Seven Stones; and the Telegraph in line with Hanjague Id., W. by S. ¼ S., leads ⅔ m. to the S.

SCILLY TO LIZARD.

Malby & Sons Lith.

WOLF ROCK (182 ft. long at L.W., and 152 ft. broad) uncovers 11¼ ft. at L.W. sps., 7¾ ft. at L.W. nps., and is awash at H.W. nps. It is steep-to, there being 34 fms. on all sides within 1 m. of rock, 38 fms. in its stream E. and W., and 34 to 37 fms. between it and Lands End. The Lt.-ho. on it exhibits a *revolving* Lt. (see p. 96).

MAKING the LAND.—The Lands End is visible 26 m. off in clear weather. Approaching it from S.W. or S., it makes as two detached hummocks; on nearing it, another hummock will be seen, and then Cape Cornwall. The most conspicuous objects are the steeples of St. Buryan and Sennan churches, elevated respectively 488 and 358 ft. above H.W.

BRISONS are two rocky islets, 90 and 71 ft. high, lying ½ m. W. ½ S. from Cape Cornwall, and 3⅓ m. N.E. ¼ N. from Longships.

LONGSHIPS ROCKS (20 to 45 ft. above H.W., and ½ m. in extent, S.S.E. and N.N.W.) lie 1 m. W.N.W. from Lands End. From the Lt.-ho. (*fixed* Lt., see p. 96), St. Agnes Lt.-ho. bears W. 25 m.; Wolf Lt.-ho. S.W. ⅓ S. 7¾ m.; Runnel Stone buoy S.S.E. 4 m.

At 2¼ m. S.S.W. ¼ W. from Longships is the **Carn Base**, a rocky patch of 9 fms. on the N. part of a bank of irregular soundings, on which the sea is heavy in bad weather, particularly in N.W. gales, when its locality should be avoided, especially by small and heavily laden vessels.

Coasters use a channel ½ m. wide, carrying 8 to 11 fms., between Longships and Lands End. To run through, keep the highest part of the N. Brison a little W. of the highest part of the S. or lowest Brison, N.N.E. ¼ E.

RUNNEL STONE (covers at ⅔ flood) lies ¾ m. off shore, with the *two beacons* on land abreast in one, N. by E. ½ E. The S., or outer beacon, is conical, and painted *red*; the inner, or N. beacon, has a large base and is *black*, except a small part of the pillar painted with a white band immediately above the base. A *black* (bell) *buoy* with *staff* and *globe* is moored in 22 fms., S.W., 1½ cables from the rock. (This buoy often breaks adrift.)

Other rocks lie in the vicinity of the Runnel Stone, but none outside or S. of it. Strangers should not use the passage between it and the land.

DIRECTIONS.—Bound round the Lands End from the E.,—Godolphin hill open of Carndu Pt., E. ½ N., leads ⅔ m. S.E. of Runnel Stone; and Longships Lt.-ho. N. ½ W., leads 1 m. W. When near the Runnel Stone, and no marks visible, by keeping the whole of the white band of the N. beacon in sight above the land, will lead outside it. The Longships rocks may be passed at 2 cables distance, as the outlying dangers are not more than a cable from the rocks. There are strong eddies at 4 cables from Longships, which small vessels should guard against.

At night, the Longships *red* Lt.* (see p. 96) will open out of Tol Peden Penwith (the S.E. extreme of Lands End) on a N.N.W. ¾ W. bearing, and

* **Caution.**—The new Longships Lt. (*fixed white* and *red*), is used for these Directions, as there is every reason to expect that the apparatus for it will be ready and the Lt. exhibited before January 1874, but until a Notice is given of its exhibition the old Lt. (*fixed white*) and former directions will remain in force.

will continue this colour until it bears N. by W., when the Lt. will show *white*. This latter line of bearing passes about ¾ m. outside Runnel Stone, which will therefore be avoided by keeping the white Lt. in sight.

Approaching Longships from the N.E., the *red* Lt. will open out of Cape Cornwall on a S.W. bearing, and will continue this colour until it bears S.S.W. ½ W., when the Lt. will show *white*. This latter line of bearing passes ½ m. outside the Brisons, which will be avoided, and also all danger off this part of the coast, by keeping the white Lt. in sight.

MOUNTS BAY has 5 tidal harbours in it, viz., Mousehole, Newlyn, and Penzance on its W. side, Mount St. Michael at its head, and Port Leven on its E. side, but they all dry out at L.W., and none should be attempted with on-shore gales. Guavas lake is in the N.W. part of the bay, and both it and the inner part of the bay afford good *summer* anchorage, except with winds between S.S.W. and S.E., which send in a heavy breaking sea; but the powerful undertow (as in Torbay) enables a vessel to ride easy. In E. and S.E. gales there is good anchorage on E. shore of the bay, off the N.W. side of Mullion Id., in 10 fms. with that Id. bearing S. ½ E., and Mullion ch. E. ¾ S.; also in 7 fms. S.S.W. 1 m. from Loo Pool; and in 11 fms. off Port Leven, with Helstone ch. N.E. by E. and Cuddan Pt. N.W.; but be prepared if the wind should shift suddenly to the W.

LANDMARKS.—Mount St. Michael, at the Hd. of Mounts Bay, is of conical form, 262 ft. high, and 1 m. in circumference. Godolphin hill, 532 ft. high, is on N.E. shore of Mounts bay, 3 m. E.N.E. of Cuddan Pt. Mullion Id., 118 ft. high, on E. shore of the bay, is precipitous on its W.N.W. side. The Lt.-ho. on Penzance S. pier-hd., exhibits a *fixed* Lt., which shows *red* for 80° of the circle (or from 1 cable S. of beacon on Raymond, to 1 cable E. of buoy on Gear) when there is 15 ft. water at pier-hd., which is quite 8 hours out of 12; the remainder of the circle it shows *white*. When less than 15 ft. at pier-hd. the Lt. shows *green* instead of red. A ball is hoisted on a pole at the old pier end by day when there is 15 ft. at pier-hd.

Mousehole Harbour (area 1¼ acres) is formed by two piers, and the entrance 49 ft. wide, is sheltered from E.S.E. to S.E. by S. by St. Clements Id. The bottom is gravel on rocky ground, and the tide rises over it 7 ft. at sps., 4 ft. at nps. The S. channel to the harbour, between St. Clements and the main, is best. The N. channel is foul, contracted, and only ½ cable wide.

Newlyn Harbour (area ½ an acre) is formed by a curving pier, and will contain about 30 or 40 boats averaging 15 tons burthen. The bottom is gravel, and the tide rises over it, 6 ft. at sps., 3 ft. at nps. The sand dries 104 ft. outside the pier at the lowest tides.

Penzance Harbour (area 28 acres) is formed by two piers. It has a building yard and a dry dock (see p. 119); and the cranes on the piers can lift 5 to 10 tons. Entrance between the pier-hds. is 110 yds. wide. The tide rises in the harbour 17 ft. at sps., 13 ft. at nps., and nps. range 9 ft. There

is 25½ ft. at H.W. sps. at E. extreme of harbour, and 22½ ft. at nps. At S. pier-hd. there is 6 ft. at L.W. sps.

Mount St. Michaels Harbour (area 2¼ acres) is formed by two piers, and the tide rises 11 ft. in it at sps., 7½ ft. at nps. The entrance, 124 ft. wide between the pier-hds., has 16 ft. in it at H.W. sps., 12½ ft. at nps., and nps. range 9 ft.

Port Leven.—The entrance is 240 ft. wide between the end of the pier and the Deazle rocks, which dry 2½ ft. at L.W. sps. At 1¼ cables within the entrance, are the outer pier-hds. 134 ft. apart. At 73 yds. farther in are the inner pier-hds., with gates 32 ft. wide, on sill of which is 13½ ft. at H.W. sps., 10 ft. at nps. At entrance there is 6 ft. at L.W. sps.

DANGERS.—The following are the principal dangers to avoid in approaching the W. *side* of Mounts bay from the S.—**Tregiftian** rock, with 4 ft. water on it, lying ½ m. W. from Tetterdu Pt.—**Buck** rocks cover at ¾ flood at 2 cables E. of Tetterdu Pt.—**Haver** rock covers at ¼ flood off Carndu Pt.—**Lelland** rock covers at ¼ flood at 2 cables E. of Carndu Pt.—**Low Lee** rock, with 4 ft. water on it and steep-to, lies ⅓ m. E. of Penlee Pt., and is marked by a *red buoy*, moored 30 yds E. of the rock.—**Carn Base** rock, at ⅓ m. N. of Low Lee, has 4 feet water, and steep-to.—**Gear** rock, at ½ m. S. by W. ¾ W. from Penzance Lt.-ho., covers at ⅓ flood, and is marked by a *black* nun buoy. (See foot-note, p. 12.)

Cressar, Raymond, and **Hogus** ledges extend from the Hd. of Mounts bay, the former and latter running off ⅓ m., tho Raymond ½ m. The S. extreme of Cressar covers at ⅔ flood; on their W. limit is an iron *red beacon*, surmounted by a *ball*. The extreme of Raymond covers at ⅓ flood, and is marked by an *iron beacon* with a *ball*.—**Guthen** rock, of 10 ft. water, lies a long cable off W. shore of Mount, and W.N.W. from its castle.—**Maltman** rock covers at ¼ flood at 1 cable off shore, and S.W. ½ S. from the castle.

The following rocky shoals are on E. *side* of Mounts bay:—**Boa,** of 6 fms. water, breaks heavily in S.W. gales at 3 m. N.W. by W. from Lizard, and 1½ m. W. ¾ N. from Rill Hd.—**Welloe** dries 5 ft. at ⅔ m. S.W. ¾ W. from Rinsey Hd.—**Great Row,** of 3 fms. water, and foul uneven ground on all sides, lies 1 m. S.W. by W. from Welloe, and 2¼ m. off Cuddan Pt.—**Iron Gates,** of 4 fms., lies 2 m. S.W. ½ S. from Cuddan Pt.—**Mountamopus,** of 5 ft. water, lies ¾ m. S. of Cuddan Pt., and a *black buoy* marks its S. edge.—**Carn Mallows,** of 3 fms. water, is ½ m. S.E. of Mountamopus.

DIRECTIONS.—Bound into Mounts bay from the W.—Godolphin hill open of Carndu Pt. E. ½ N., clears the Runnel Stone; and Mount St. Michael open of the same Pt. N.E. by E. ¾ E., clears the Buck rocks. Keep 3 cables off Carndu Pt. in passing to avoid the Lelland; when the shore may be neared to ¼ m. St. Clements Id. can be passed at 1 cable, after which Trithal engine ho. in line with York ho., N. ¼ W., or Penzer cliff open S. of Clements Id., leads E. of Low Lee and Carn Base, and direct to the anchorage in 9 fms., with the Mount tower in line with St. Hilary ch. spire bearing E., and the

buoy* on Gear rock N. by E. ¾ E. Coasters anchor in Guavas lake, in 4½ fms., with St. Clements Id. shut in with Penlee Pt.

Approaching from the S.—Ludgvan ch. on with the Mount tower N. ½ E., or Acton castle open W. of Cuddan Pt. N.E., leads W. of Iron Gates and Mountamopus buoy. Trigoning signal-hill open E. of the town of Trewavas N.E. ¼ E., leads E. of Great Row and Welloe.

AT NIGHT—bound into the bay from the E., caution must be used in hauling to the N., particularly if there is any ground swell on, for the sea then breaks heavily on the Boa and Iron Gates. After passing the Boa, the W. Lizard Lt. kept in sight, S.E. ¾ S., leads to St. Clements Id.; or the *red* Lt. (or *green*, according to height of tide, see page 10) on Penzance pier, N. by W. ½ W., leads W. of Iron Gates and up to the anchorage.

Beating in—tacking on the W. limit of the *red* (or *green*) Lt. will keep a vessel E. of the Low Lee, Carn Base, and Gear rocks; and tacking on the N. limit will keep her clear of the foul ground at head of the bay.

LIZARD TO START.

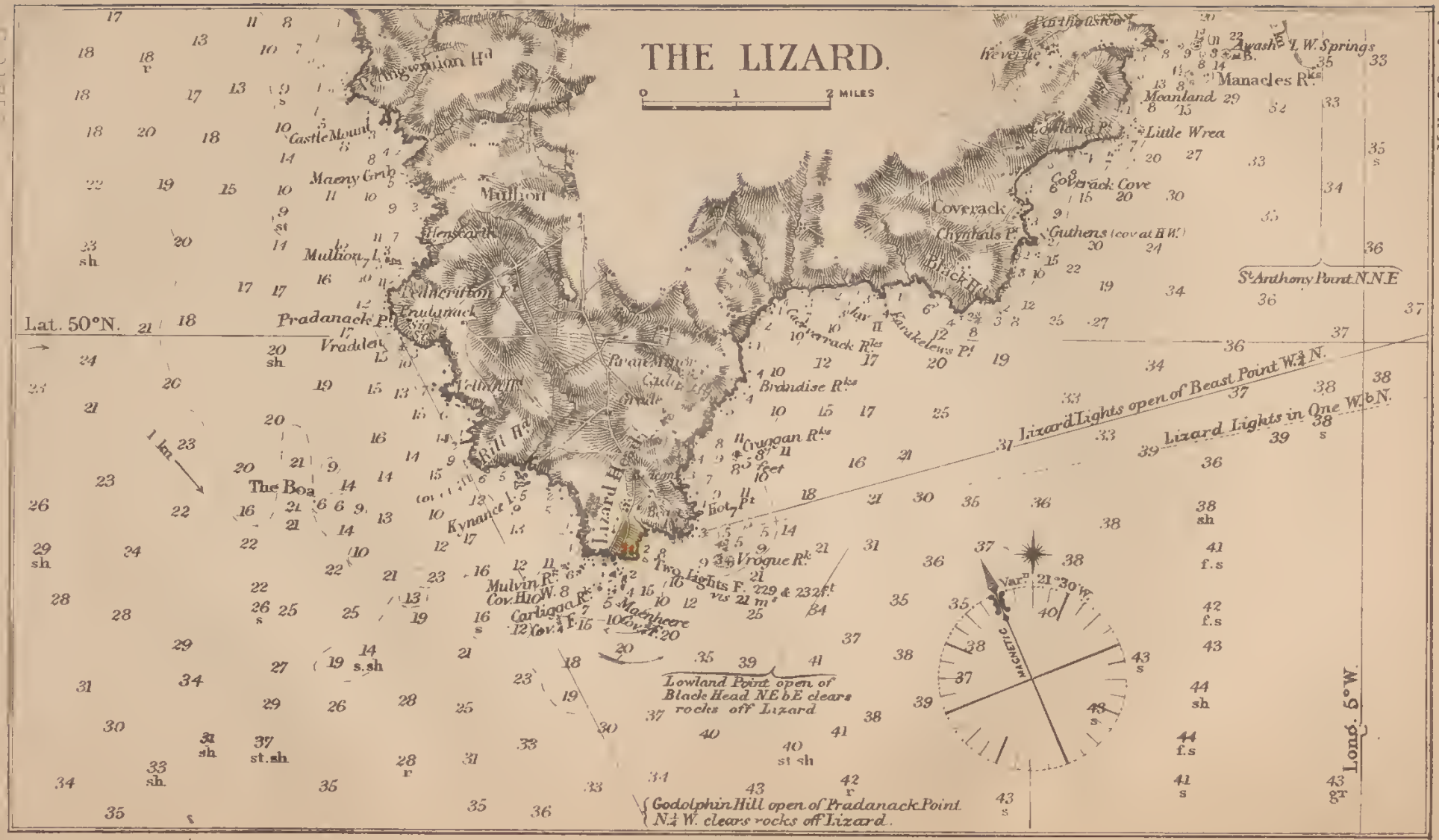
VARIATION, 21° 35′ TO 21° W.

MAKING the LAND.—The Lizard is the best land-fall to make when bound into the Channel from the W. It is bold, precipitous, and easily recognized by its two white Lt.-houses. From thence to the Start the land is moderately high, its continuity apparently broken by the deep inlets between Helford and Looe.

Nearly midway between Lizard and Rame Hd., the Dodman (a steep precipitous bluff 300 ft. high, facing E., and sloping W.) stands boldly out; and Gribbin Hd., 250 ft. high, just W. of Fowey, is marked by a square *beacon* tower. From thence to Looe the land is high and irregular, lower towards Whitesand bay, but again rising towards Plymouth.

From Plymouth the land trends S.E. towards the Start. The Mewstone is a good offing guide for this part of the coast. Yealm Hd. has a yellow stripe in a high ravine on its S.E. side. Stoke Pt. has a light coloured base, and ⅓ m. E. of it are 2 conical stone *beacons*, 6 ft. high, for pointing out the position of Stoke Pt. rock. Between Yealm Hd. and Bolt Hd., the even-topped heights of coast-ranges are quite towered over by the Dartmoor hills with their craggy Tors; but on a near approach Thurlestone, Churchstow, Bigbury, and Marlborough churches (two former have square towers, two latter sharp spires) will point out the land in their locality. Bolt Tail is 225 ft. high, Bolt Hd. 416 ft., and the dark rugged cliffs between them 400 ft.; thence to

* The Gear rock is to be marked by an iron beacon; the top of the globe 30 ft. above L.W.


THE LIZARD.
0 1 2 MILES
Lat. 50°N.
Long. 5°W.
Lizard Lights open of Beast Point W.¾N.
Lizard Lights in One W.bN.
Lowland Point open of Black Head NE bE clears rocks off Lizard
Godolphin Hill open of Pradanack Point N.¼W. clears rocks off Lizard.
St Anthony Point N.N.E
Manacles Rks
Meanland
Little Wrea
Coverack Cove
Coverack
Guthens (cov at H.W.)
Chynhals Pt
Black Hd
Lowland Pt
Kerakelews Pt
Brandise Rks
Cruggan Rks
Vrogue Rk
Two Lights F.
Maenheere
Carligga Rk
Mulvin Rk
Kynance I.
The Boa
Rill Hd
Lizard Head
Pradanack Pt
Vradden
Mullion
Mullion I.
Maeny Grib
Castle Mount
Pengwinion Hd
Henscarth
Pradanack
Lizard Lights
Var.n 21°30'W.
MAGNETIC
Malby & Sons, Lith

the Start the coast is less abrupt, but of the same height, and broken by ravines.

LANDMARKS.—Lizard Lt.-houses are *white*, and 74 yards apart. Each shows a *fixed* white Lt., and when in line, W. by N. and E. by S., they lead 3 m. S. of Manacles and 3½ m. S. of Wolf; the latter mark requires clear weather, and the eye elevated 30 ft. Three *beacons* mark the position of the Vrogue rock. One (red) stands on the Balk, the two others (N.W. beacon *red*, S.E. beacon *white*) stand on Beast Pt.;* the latter are 8 ft. high, and 96 yds. apart. Mawnan ch. (square tower) is on a hill on N. side of entrance to Helford. The *beacon* tower on Gribbin Hd. is square, 84 ft. high, and painted in *red* and *white* horizontal stripes.

DANGERS OFF LIZARD.—Stag rocks extend nearly ¾ m. off the Lizard, with 5 to 9 fms. close to and among them; the outer rocks cover from ½ to ¾ flood.

Vrogue rock, lying 4 cables S.E. from Beast Pt., and 1 m. E. by S. ½ S. from Lizard Lts., has but 6 ft. on it. *Marks*:—The two beacons on Beast Pt. in one, N.W.; the Balk beacon in line with the middle hummock (*whitewashed*) on Hot Pt. N. by W. ¼ W.; and Ruan Minor ch. tower in line with the W. ridge at entrance to Cadgwith N. by E. ½ E.—Balk beacon on with N.E. extreme of Hot Pt. N. by W. ½ W., leads 1 cable N.E. of Vrogue; Polpear Pt. open of Bumble rock W.N.W., leads 1 cable S.

Spernan shoals are patches of 5 fms. lying ½ m. E. of Vrogue. *Marks* for outer or E. patch:—Beast Pt. W. by S. ¾ S., ¾ m.; top of W. Lizard Lt.-ho. just showing S. of E. Lt.-ho., W. by N. ¼ N.; Treleague ho. just open of W. side of Cadgwith cove, N. ¼ W.

Clearing Marks.—Godolphin hill on with Pradanack Pt., or Pradanack Pt. open of Rill Hd., N. ¼ W., leads ⅓ m. from W. side of Stags; and Ynys Hd. or beach at Kennack cove open E. of Beast Pt., N.E., or the village on Black Hd. its length open of Beast Pt., N.E. by E. ½ E., leads the same distance from E. side. *But to avoid all shoal water off the Lizard*, keep Godolphin hill open W. of Pradanack Pt., N. ¼ W., until Lowland point (Lowland barn is pulled down) opens E. of Black Hd., N.E. by E.

Ripplings are common at 2 or 3 m. S. of Stags, and S.E. of Lizard.

The COAST between Beast Pt. and the Manacles has several off-lying dangers, and should not be approached by a stranger within ¾ m. The Craggan and Va rocks are much in the way of coasters anchoring to await tide or weather to go round the land. The Craggan has 5 ft. on it at L.W. sps., and lies ½ m. S. of Cadgwith cove. The Va dries 3 ft. at L.W. sps., and lies 1½ cables E.S.E. of S. point of Perran Vose cove. The several coves or inlets, named Housel, Perran Vose, Cadgwith, and Beaglo, are frequented by coasters in N. winds.

* **Signal Station.**—There is a Signal Station-house, 30 ft. high, and signal staff on Beast Pt., about ¾ m. E. of Lizard Lt.-houses, with which shipping can communicate by signal and forward advices. (See foot-note, p. 7).

Coverack cove, at 1½ m. N. of Black Hd., has a pier for coasters that can take the ground, and which shelters from S.W. (round by W.) to N.E. There is 12 ft. within the pier at H.W. sps., and 8 ft. at nps. The best anchorage off the cove is in 4 fms., with the pier end W. by S. ½ S. distant ¼ m.

Porthoustoe cove, on the N. side of Manacle Pt., shelters from the W. So does the coast from hence to Nare Hd., there being anchorage anywhere at ¾ m. off shore in 6 to 9 fms. Porthalla bight, at 1 m. S. of Nare Hd., is bordered with rocks.

MANACLES ROCKS, connected by ledges, are 3 m. E.N.E. from Black Hd., and nearly 1 m. S.E. ½ S. from Manacle Pt. They all cover at H.W. sps. except the S.W. rock, named **Carn Du,** which is then 5 ft. above water.

At ½ m. E. by N. from the Carn Du are the **Penwin** and **Vase** rocks, ½ cable apart N.N.E. and S.S.W. The Penwin (the outer rock) is awash, and the Vase has 4 ft. on it. at L.W. sps. A *black* (bell) buoy, with *staff* and *ball,* and the word "Manacles" on it, lies in 22 fms. at ½ cable S.E. of Penwin.

Clearing Marks.—Give the Manacles a good berth in light winds, as the tide there sets round the compass. Approaching from the Lizard, keep Beast Pt. open of Black Hd. W. by S. until the tower of Mawnan ch. is *well* open of Nare Pt., N. by W. ¼ W. A vessel will be N. of them when the houses on the S. side of Porthoustoe cove come in sight, W. by N. ¾ N.

At night, keep the Lizard Lts. open S. of Beast Pt.,* W. ¾ N., until St. Anthonys *revolving* Lt. bears N.N.E.—or keep St. Anthonys *fixed* Lt. in sight, between bearings of N.N.E. ½ E., and N. by E. ¼ E.; but remember that the former bearing leads only 2 cables E. of Manacles.

Coasters pass between Manacles and shore, in 4 to 6 fms., a proceeding not to be attempted by a stranger.

HELFORD RIVER entrance is 1½ m. wide, with 6 fms. in it, and the water shoals to 2 fms. at 2½ m. within. When entering avoid the **Gedges** rocks, lying ¼ m. from the N. shore. The Observatory tower at Falmouth open of Penzance cliff, N.N.E. ¾ E., leads E. of them; Bosahan Pt. open of Mawnan Chair Pt., W. by N. ¼ N., leads S.; and highest Manacle rock on with H.W. mark on Nare Pt., S. ¼ W., leads W.

When past the Gedges keep half cable off both shores until abreast of Dourgan. Then the white ho. of Calamansack in line with W. Pt. of Porth Navas, N.W. by W. ¾ W., leads up to the anchorage off Helford, in 4 fms., mud, the old Ferry ho. bearing N. ¾ E.

FALMOUTH HARBOUR.

This well-sheltered harbour has on its S. shore an Outer or Tidal harbour, two graving docks, and a gridiron. (For docks, see p. 119.) The gridiron is 170 ft. long, 40 ft. wide, with 13 ft. water on it at H.W. sps. The Tidal harbour, 42 acres in area, is between two piers or breakwaters, and the entrance,

* Beast Pt. being higher than the Lizard, will exclude the view of the Lts. if Black Hd. is approached nearer than 1½ m.

500 ft. wide between pier-hds., faces the N.E. The depth in it, and in the channel leading to it from Falmouth harbour, is 18 ft. at L.W., or 34 ft. at H.W. sps. The E. breakwater, 1400 ft. long, has 22 ft. at L.W. sps. along its wharves; the W. breakwater, 1100 ft. long, has 18 ft. Sps. rise 16 ft., nps. 12 ft., and nps. range 8 ft.*

The entrance to Falmouth is divided into two channels by Black rock. The E. channel is best, being nearly ½ m. wide, and carries 5 to 18 fms. at L.W. The W. channel is not half that width, and carries only 20 ft.

LANDMARKS.—Falmouth will be recognized by Pendennis castle, 233 ft. above the sea, on W. side of entrance, and by the white Lt.-ho., 62 ft. high, on St. Anthonys Pt. on E. side. The Lt.-ho. exhibits a *revolving* white Lt., showing a bright face every *twenty seconds*; and there is a *fixed white* Lt. at 37 ft. below the revolving Lt. to clear the Manacles (see p. 97). A *fixed green* Lt. is shown on end of E. pier of tidal harbour. Killiganoon ho. stands 285 ft. above the sea, at 5 m. N. ¾ E., from Pendennis castle.

DANGERS.—Old Wall rock, lying 1¼ m. S. ½ E. from St. Anthonys Pt., is a pinnacle with 27 ft. on it, and 5¾ fms. close to on all sides; between it and the shore are several 4-fms. rocky **patches.** *Marks* for the Old Wall:—Restronguet smelting ho. in line with E. end of broken rocks off St. Anthonys Pt., N. ½ W., and Greeb Pt. just showing E. of Killygerran Hd., N.E.

Black rock, on which is a *beacon mast* with *ball* on summit, lies N.W. ⅓ W. nearly ¾ m. from St. Anthonys Pt., and covers at half-flood, or 8 ft. rise. Two **patches** of 17 ft. lie respectively S.S.E. 1 cable, and S.W. ½ S. 1½ cables from Black rock; and within it, towards spit of Falmouth bank, are some **patches** of 20 ft.

Governor rock, lying N. by W. ½ m. from Black rock *beacon*, has 12 ft. on it at L.W. sps. A *chequered black* and *white* (can) buoy is moored in 15 ft., at 60 yds. E. by S. from the rock.

Lugo rock, lying 1¾ cables S.S.W. from St. Mawes castle, uncovers 2 ft. at L.W. sps. A *black* buoy is moored 50 yds. S. of the rock.

The Narrows are ¾ m. N. by E. ¾ E. from Black rock, between Falmouth bank on the W., and St. Mawes bank on the E. The edge of Falmouth bank is marked by a *white* buoy, and the edge of St. Mawes bank by a *black* buoy. There is also a *black* buoy on the Vilt, the name given to the N.W. prong of **St. Mawes** bank, at the entrance of Cross road.

ANCHORAGE.—If desirous of anchoring *outside* Falmouth harbour, take a berth in 10 fms., about 1 m. S.W. by W. ½ W. of Lt.-ho.; then should the wind veer to the E., making it unsafe to remain, either run into the harbour or proceed to sea.

Carrick road is within the Narrows, between St. Mawes and Falmouth banks, and carries 13 to 15 fms., mud. The upper part is the best. With

* Additions to 1874 by Mr. J. Bennett, Superintendent and Dock Master.

the wind east of S., bring up with port anchor in 12 or 13 fms. rather towards St. Mawes bank, and moor with starboard anchor in 12 fms. towards Falmouth bank. With the wind west of S., the starboard anchor should be towards Falmouth bank, and the port anchor towards St. Mawes bank. Keep open hawse.

Cross road has better shelter and more room. Bring up with either bower in 10 to 14 fms., and moor with open hawse to the W.

Small vessels cross over Falmouth bank and anchor off the town in 2 to 2½ fms., or lie aground alongside the quays.

DIRECTIONS.—Bound to Falmouth from the W.—at *night* keep Lizard Lts. open S. of Beast Pt. W. ¾ N., until St. Anthonys *revolving* Lt. bears N.N.E., when steer for it on that bearing; pass about ¼ m. W. of it, and then steer N. for Carrick Road. St. Anthonys *fixed* Lt. kept in sight between N.N.E. ½ E. and N. by E. ¼ E. also clears the Manacles. (See page 14.)

By *day.*—Beast Pt. kept open of Black Hd., W. by S., leads 1 m. S. of Manacles. When St. Anthonys Lt.-ho. bears N.N.E., keep it so till Killaganoon ho. comes in line with Mylor Pt. bearing N., which mark will lead through the E. channel, and between *black* buoy on E. side of Narrows and *white* buoy on W. side, into Carrick road—or having arrived about 1½ cables W. of Vilt *black* buoy, proceed on through Cross road with the tower of the Meteorological Observatory just open S. of Falmouth ch., W. by S. ½ S., and when St. Keverne ch. comes over Pendennis Pt., S.W. ½ S., anchor in St. Just pool in 12 to 15 fms. mud.

In thick weather, when these marks cannot be seen, pass St. Anthonys Pt. at ¼ m.; then, keeping the land at St. Mawes about a point on the starboard bow, steer N. for Mylor Pt. Never go within two cables of the land at St. Mawes, nor nearer St. Mawes bank than the depth of 9 or 8 fms. Give the rocks off St. Anthonys Pt. a good berth, and Black rock a berth of 2 cables.

Entering by the W. channel, steer midway between Pendennis Pt. and the 17-ft. patch lying 1½ cables S.W. ½ S. from Black rock, and when Black rock beacon and Lt.-ho. are in line, steer for St. Mawes castle until Killaganoon ho. comes in line with Mylor Pt., N., when proceed as before.

The ebb sets out of the harbour, S.S.W., to about 1 m. from entrance, when it runs S.W., and farther off W.S.W. and W. by S. Off the Manacles the stream runs westward nearly 3 h. after L.W. by the shore. To work out of the harbour large vessels should weigh on the latter part of the flood, or a little before high water, and before half ebb they will be half way to the Manacles. As the ebb sets to the westward, stand no farther W. than the meridian of Pendennis Pt., keeping the harbour entrance open for the benefit of the harbour tide.

GERRAN and **VERYAN BAYS** are separated by Nare Hd., which is midway between Falmouth and the Dodman. Gerran bay is on the W., and Veryan on the E. side of Nare Hd., and both have moderate depths, and

Plate 3.

Malby & Sons, Lith.

shelter from N. winds. Gerran ch. spire (254 ft. above H.W.), in W. part of Gerran bay, is conspicuous; Nare Hd. 260 ft. and Dodman 363 ft. above H.W., are prominent headlands. In bad weather give the Dodman a berth of 2 miles; for 1 m. S.W. by S. to S. by E. from it, the soundings are irregular, 10 to 5½ fms., causing heavy **overfalls.**

Killygeran Hd. is 1½ m. E. by N. from the entrance of Falmouth, and at 1 m. N.E. of it is Greeb Pt., off which **Shoal** water, 3½ to 7 fms., extends S.E. nearly 1 m., terminating in the **Bizzies** shoal of 3½ fms. At 6 cables S.E. by E. from Nare Hd., and ¼ m. from the nearest shore, is **Gull** rock, 125 ft. high, with a clear passage of 18 ft. water between it and the land. Detached rocks, named **Whelps,** lie S.W. ¼ S. from the Gull; the highest is 3 cables from the Gull, and covers at ¾ flood; and S.W. 35 yards from it is a small rock covering at ¼ flood. **Lath** rock, of 7 ft. water, lies E. ¾ N. 1½ m. from the Gull.

MEVAGISSEY, ST. AUSTELL, and TYWARDREATH BAYS are between Chapel Pt. and Gribbin Hd., which bears from the Pt. E. by N. ¾ N. 5 m. Mevagissey bay shelters from S.W. gales in 7 to 10 fms., sand. Shelter from these gales will also be found in the S. part of St. Austell bay, off Rope Hawne, in 6 fms., stiff mud. Tywardreath bay shelters from E. gales in 5 fms., sand, between Polkerris and Little Gribbin Pt.

Landledra Pt., only 20 ft. high, is 1¼ m. N.E. of Dodman, and extending 1½ cables E. by S. from it are the **Western Oar** rocks, which cover at ¼ flood. **Gwineas** rock, 26 ft. above H.W., lies 2 m. E.N.E. from Dodman, and ⅔ m. S. ½ W. from Chapel Pt.: at 1½ cables S.E. by E. ¼ E. from it is the **Yaw** rock, which dries 3 ft. Chapel Pt. is low, and ½ m. S.W. from it is Turbot Pt., off which, S.S.E. a cable's length, is a rocky **patch** of 11 ft., narrowing the passage between this Pt. and the Gwineas to ⅓ m.; between this patch and the Gwineas is 5 to 7 fms.

Gribbin Hd. (see page 12) is bordered by rocks. S.E. ½ E. from the beacon on the Hd., and ¼ m. off shore, is the **Cannis** rock, which covers at ¾ flood; there is a narrow passage of 9 ft. water between this rock and the land.

MEVAGISSEY HARBOUR.—Portmellin is a sandy cove ⅔ m. N.W. of Chapel Pt.; and ¼ m. farther N. is Mevagissey harbour, which shelters vessels that can lie aground, but a great run sets in with S.E. gales. Area of harbour 3½ acres; quayage 230 yds.; entrance between piers 106 ft. wide. Tide rises 14½ ft. in harbour at sps., 10 ft. at nps. Bottom dries 1½ cables outside piers.

PENTUAN TIDAL BASIN.—At ½ m. N.E. of Mevagissey is Pen-nare Pt., and on E. side of beach, ¾ m. farther N., is Pentuan tidal basin, the entrance to which is secured by gates 28 ft. wide, with sill 2½ ft. above L.W. sps. A pier, running off S.E. 530 ft., protects the gates, across which timber balks are placed during S.E. gales. The basin has 300 yds. of quayage, 14 ft. in it at H.W. sps., 10 ft. at nps. The sand dries a cable outside entrance.

CHARLESTOWN HARBOUR, in N. part of St. Austell bay, will berth 15 vessels of 150 to 200 tons. Area of harbour 1 acre, quayage 317 yds.,

entrance between piers 53 ft. wide, outside which the bottom dries 200 ft. At head of harbour is a small tidal basin ¾ of an acre in extent, and gates 27 ft. wide. Tide rises 14 ft. between pier hds. and over sill of basin at H.W. sps., and 10 ft. at nps.

PAR HARBOUR, in N.E. part of Tywardreath bay, is formed by two piers, the outer of which runs off E. 347 yds., and protects the harbour from S. winds. Area of harbour 26¼ acres, quayage 557 yds., and there are berths along the inner pier for 30 vessels of 100 to 200 tons. Entrance between piers 125 ft. wide, outside which the sand dries 1¾ cables. Tide rises 14 ft. at entrance and in harbour at H.W. sps., 10 ft. at nps.

POLKERRIS HARBOUR, also in Tywardreath bay, at ¾ m. S.E. from Par, is sheltered from the W. by a pier extending from its S. side. Area of harbour ¼ of an acre, quayage 70 yards. The bottom dries 30 yds. outside pier end, and the tide rises 14½ ft. in harbour at H.W. sps., 10 ft. at nps.

FOWEY HARBOUR, 9 m. E.N.E. of Dodman, and 1½ m. E. of Gribbin Hd., has anchorage ¼ m. within its entrance for vessels drawing 16 ft., and ½ m. within (above bar) for those of 18 feet.; but as the deep water space is confined they should moor. The bar (soft mud) has 3 to 5 ft. on it at lowest tides; sps. rise 15 ft., nps. 12 ft., and nps. range 9 ft.

The entrance, although open to S.W. by W., has no swell with S.W. gales. Vessels can leave it with a S. by E. wind, and coasters embayed in S. gales run for it even with loss of anchors, and safely ground on the mud.

DIRECTIONS.—The entrance will be known by the ruins of St. Saviours ch. on E. side, the old mill on high ground on W. side, and by the beacon on Gribbin Hd. Approaching from the W., to clear Cannis rock, keep Dodman Pt. showing S. of Gwineas rock, W. by S. ½ S., until Fowey ch. tower is on with W. Pt. of entrance, N.E. by E.; then steer midway between entrance Pts. There is no danger off either Pt. except **Mundys** rock, with 5 ft. water on it, lying within and on W. side of entrance. Coming from the E. keep about ½ m. off shore until the entrance opens, when proceed as before.

There is good anchorage outside the harbour in 5 to 8 fms., sand, with Fowey ch. showing over E. Pt. of entrance, and the points of coast eastward open.*

UDDER ROCK and DOWNEND SHOALS.—Nearly 4 m. E.S.E. of Fowey is Nealand Pt., known by its overhanging cliff. About 1 m. W. of this Pt., and ½ m. off shore is the Udder rock, which dries 2 ft. From it the peak of Looe Id. is in line with Orestone Pt., E. ¾ S., and the *beacon* on the shore in line with Shag rock (whitewashed) N.E. ½ E. To pass ½ m. S. of it, keep the N. extreme of Looe Id. on with Orestone rock bearing E.; and to pass E. or W. of it, keep the *beacon* on the shore E. or W. of Shag rock. Downend shoals, with 2 fms. on them, lie ¼ m. off Downend Pt. **Larrick** rock covers at ¾ flood at 1½ cables W. from Nealand Pt.

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* Additions to 1874 by Mr. W. Hick, Harbour Master.

POLPERRO HARBOUR is formed between an outer and inner pier at the head of a small inlet 1 m. E. of Nealand Pt. It is 3 acres in extent, and has 11 ft. in it at H.W. sps., 5 ft. at nps. The entrance, between outer pier head and shore, is 54 ft. wide; outside this the sand dries 1 or 2 ft. for 50 yds.; the water then gradually deepens to 3½ fms.

The mouth of the inlet is 160 ft. wide, with a rocky *patch* of 9 ft. in mid-channel; and ½ a cable S. of this patch is *another patch* of 4 ft.

LOOE HARBOUR is ¾ m. N.N.E. from Looe Id., and 9 m. N.W. ½ W. from Rame Hd. A jetty runs out S.E. 167 yds. from E. Pt. of entrance, and the distance from its extreme end to W. shore is 150 ft.; the bottom dries 200 ft. outside the jetty. There is 12 to 16 ft. in harbour at H.W. sps., 9 to 13 ft. at nps.; at E. quay, 12 ft. at sps., 9 ft. at nps.; at W. quay, 10 ft. at sps., 7 ft. at nps. Outside the harbour, sps. rise 16 ft., nps. 13 ft., and nps. range 10 ft.

Looe Id. is ½ m. in circuit and 145 ft. high; and extending ¼ m. S.E. from its S.E. extreme are the **Rennies** rocks which cover at ¼ flood. The passage between the Id. and the coast nearly dries at L.W. sps.

Looe road being only open from S. by W. to S.E. by E. affords shelter from W. winds. Approaching from the W., the beacon on Gribbin Hd. in line with Nealand Pt., W. by N. ¾ N., leads ¼ m. S. of the Rennies rocks. When the tower of East Looe ch. comes well open of W. Pt. of entrance, N. ¼ W., steer N.N.E. for the road, anchoring in 4 to 8 fms., mud, with the latter mark on, and the summit of Looe Id. from W. to S.W. by W. If of light draught, anchor farther in over sand bottom, with the ch. N.N.W. ½ W.

SHERBETERRY ROCKS.—Seaton beach is 2½ m. E. of Looe, and off it are several 4½ fms. patches; from the outer of which, 2 m. from the beach, the beacon on Gribbin Hd. is open of Nealand Pt., W. by N. ¾ N., and an old public ho. is on with a long hedge, N. by E. ¼ E.

Clearing Marks.—The Mewstone on with extreme of Rame Hd., S.E. by E. ¾ E., leads ¾ m. S. of the outer 4½ fms. patch, and *outside all danger* between Rame Hd. and Polperro.

PORT WRINKLE.—Longstone rock, 59 ft. high, lies close in shore 4½ m. E. by S. ¾ S. from Looe; and at ¾ m. farther E. is a small bight at the head of which is Port Wrinkle, a little pier harbour, affording shelter for fishing boats. It is entered by two channels between rocks which from the Longstone extend 1¾ cables from the foot of the cliffs.

Three *beacons* on the cliff, 400 ft. N. of the harbour, show *Lts.* at night when the boats are at sea. The two W. beacons in one, N.E., lead through E. channel, and the E. and W. beacons in one, E.N.E., through W. channel.

WHITESAND BAY, between Port Wrinkle and Rame Hd., is exposed to the whole force of S.W. gales. The soundings deepen gradually seaward, but when standing inshore never shoal the water under 6 or 7 fms. at low tide.

With off-shore winds the bight in S.E. corner of this bay affords good shelter to coasters in 3½ to 4 fms., sand, with the two W. Pts. of Rame Hd. in one, S.S.W. ½ W. Both these Pts. have *sunken rocks* 200 yds. off them.

EDDYSTONE ROCK, lying 39 m. E. ¼ S. from Lizard, 8½ m. S.W. ¼ S. from Penlee Pt., and 18½ m. W. by N. ½ N. from Bolt Hd., is awash at H.W., and dries 16 ft. at L.W. ordinary sps. Its N.W. side is clear of danger, with 10 fms. water at 200 ft. from the rock, but the other sides are foul, particularly the N.E. side, which must not be approached within ¼ m. The Lt.-ho. on it is coloured in alternate *red* and *white horizontal* bands, and shows a *fixed* white Lt. (see p. 97).

HAND DEEPS, lying N.W. ⅜ N. 3⅓ m. from the Eddystone, have 4 fms. on them, but being composed of sharp rocky *pinnacles* they require a good berth if there be much sea or swell. In bad weather they are shown by a short breaking sea, and in fine weather by tide rips. From their centre the white signal ho. on high land in rear of Rame Hd. is just W. of the chapel on Rame Hd., N.E. by E. ¼ E.; Mount Batten tower is on with Penlee Pt., N.E. by E. ⅜ E.; and the E. part of Moor hills is on with top of Mewstone, E. ⅜ N.

Clearing Marks.—Breakwater Lt.-ho. on with Penlee Pt., E. by N. ½ N., leads nearly 1¼ m. N.W. of Hand Deeps; and the Lt.-ho. on with Mount Batten tower, N.E. by E. ¼ E., leads the same distance S.E.

EAST RUTTS, from which Mewstone bears N.N.W., 7 m., Bolt Hd. S.E. by E. ½ E., 7¼ m., Bolt Tail E. ⅜ S., 4¼ m., and Eddystone W. ⅜ N., 11 m., are a cluster of rocks with 5 fms. least water on them, and 10 to 20 fms. close-to.

Clearing Marks.—The first sudden rise of land inside Praul Pt. on with extreme of Bolt Hd., leads over East Rutts; the same rise open of Bolt Hd., S.E. by E. ½ E., leads close to the S. The peak of Mewstone on with Maker church, N.N.W. ½ W., leads nearly 1 m. E.; the same peak touching Reny point, N. ¾ W., leads 1½ m. W. The coast-guard flag-staff in line with Bigbury ch., E. by N. ⅜ N., leads ½ m. N.W.; and the ruin on Borough Id. in line with Bigbury ch., N.E. by E. ¼ E., leads ½ m. S.E.

TIDAL STREAMS.—Abreast of Plymouth Sound, about 6 m. from the land, the streams are very irregular and do not turn with the offing streams. About 1¾ h. before H.W. at Devonport, the stream makes to the E. and runs about E. by S. for 1 h.; during the next hour it is scarcely sensible, after which it turns to the S., gradually changing to W.S.W. till the last ¼ ebb on the shore, when it veers from W.S.W. to W.N.W. During the first 3 h. flood on the shore, its direction changes from W.N.W. to N.W., when it begins to slacken, and to set about N., till at the last 4½ h. flood it runs E. by S. as at first. Maximum rate of both streams about 1½ knots.

At 4 m. S.W. of Eddystone the stream begins to run E. by S. when it is H.W. at Devonport, and continues about 2¾ h., when it slacks and shifts to the S. At 3¼ h. ebb on the shore it sets W.S.W.; at 4 h. W. by N.; and then W.N.W. until L.W. During the first 2 h. flood on the shore the stream sets N.W. by W., and loses its strength during the third hour, running N.W. and N. During the fourth hour, what little stream there is sets N.N.E. and N.E.; and then E.N.E. and E. by N. till about H.W., when its direction is E. by S.

From Bolt Tail to Start Point., at 4 m. off shore, at springs, the E. stream

makes at 3 h. before H.W., and the W. stream 3 h. before L.W. by the shore; the stream sets along the land, and its greatest velocity is 2¾ knots. At nps. the turn of the stream is irregular, varying from 4 to 7 h. after H.W. and L.W. by the shore, the average being 5 h. Its rate at nps. is 1½ knots: off the Start 2½ knots.

PLYMOUTH SOUND AND HAMOAZE.

The Mewstone is 4¼ m. S.E. by E. ½ E. of Rame Hd., and between is the entrance to Plymouth Sound, protected from S. gales by its Breakwater. The best anchoring ground is in 30 to 36 ft. at L.W. ordinary sps. (there is 2 ft. less at extraordinary sps.), over soft mud, within the triangle formed by Penlee Pt. in line with W. end of Breakwater; the centre of Cawsand in line with W. end of Breakwater; and the spire of St. Johns ch., Plymouth, in line with W. extreme of Mount Batten. Ships of war anchor in the southern part of this space, near the Breakwater. The anchorage for merchant vessels is on E. side of the Sound, between Rams Cliff Pt. and Mount Batten.

Cawsand bay has good sheltered anchorage, only open from S.W. by W. to S.E. by E. Anchor S. of the line of the middle portion of the Breakwater; for N. of this line is rocky ground. Large ships should keep Drakes Id. open of Redding Pt., and anchor abreast of Cawsand in 5 to 7 fms., sand, mud, and shells; small vessels can anchor farther in according to their draught, sand bottom. Small vessels will be well sheltered on the flat fronting the N. side of Drakes Id., in 2½ to 4 fms., mud, sand, and gravel.

Sutton Pool, at ⅓ within its entrance, is enclosed by piers. Between pier heads the width is 350 ft. and the depth 22 ft. at H.W. sps. Within pier heads, the depth is only 6 ft. at L.W., and the greater part, consisting of soft mud, dries.

The Plymouth Great Western docks comprise an outer harbour, floating basin, and a graving dock. The outer harbour is 900 ft. wide at entrance, and its area of 35 acres has from 2½ to 14 fms. over it at H.W. sps., and 1¾ to 12½ fms. at nps.; its E. pt. of entrance is protected by a pier, within which is a pontoon pier, jetty, coaling depots, and a graving beach. The floating basin has an area of 13 acres, is 1200 ft. long, 500 ft. broad, 80 ft. wide at entrance, 22 ft. in it at H.W. sps., and 18 ft. at nps. Vessels entering at sps. can be kept afloat at nps. in a part of the basin prepared for the purpose. Vessels requiring to enter the basin drawing more than 22 ft. can be lightened outside.* For dimensions of graving docks, patent slips, &c., see page 119.

LANDMARKS.—The Mewstone is precipitous and rocky, 194 ft. high, and distant nearly ½ m. S.S.W. from Wembury Pt., separated from it by a boat channel. Rame Hd., 335 ft. high, has a ruin of a small chapel on it, and seen from the S. it appears conical. Rame ch. has a small spire over a square tower. Penlee height, 351 ft. high, has on it a small turreted beacon-tower. The exercising Rifle-butt (a high wall) on Staddon heights, is conspicuous. The tower on Mount

* Additions to 1874 by Mr. J. S. Phillips, Dock Master.

Batten is the N.E. part of Sound. On the Hoe, at the head of the Sound, is an obelisk painted in *red* and *white horizontal* bands. Plymouth old ch. (St. Andrews) has a square tower; the new ch. (Charles ch.) has a spire. The conical beacon on E. end of Breakwater is surmounted by a mast with a large ball on summit; the mast has steps, and the ball will receive ten men in case of shipwreck. The Lt.-ho. on W. end of Breakwater is 76 ft. high, painted white, and shows a *fixed red* Lt. seaward, over Cawsand bay, and up the Sound; but it shows *white* over all the anchoring ground within the Breakwater (see p. 97.) There is a small *fixed leading white* Lt., 15 ft. below the red Lt., to guide vessels through W. channel between Draystone and Knap.

TIME SIGNAL.*—Greenwich Mean Time is daily shown at *one o'clock* P.M., by the instantaneous collapse of a canvas Cone 4½ ft. in diameter and painted black, suspended near the top of the flagstaff in the redoubt on Mount Wise, Devonport. When not in use the Cone hangs in a collapsed state.

As a preparatory notice to the observer, at *three* minutes before one o'clock the Cone is expanded to its perfect shape; and at the *instant* of 1^{h} P.M. of Greenwich Mean Time it collapses. Again, at *two* minutes later it is once more expanded; and at the *instant* of 1^{h} 5^{m} P.M. it again collapses. The second collapse is made in order to verify the first, or in the event of this not having been noted by the observer. No Time Signal on Sundays. Position of flag-staff, lat. 50° 22′ N., long. 4° 10′ 15″ W.,—or 16m. 41s. W. of Greenwich.

DANGERS OUTSIDE BREAKWATER.—Draystone reef, lying 2 cables S.E. from Penlee Pt., has 11 ft. over it, and 19 ft. between it and the Pt. A *chequered red* and *white* (conical) buoy in 5 fms. marks its outer extreme. Bovisand pier-hd. (*whitewashed*) open S. of Breakwater beacon, E. by N., leads 1 cable S. of buoy; Mount Batten tower on with Breakwater Lt.-ho., N.E. by E. ¼ E., leads 1 cable E.; and any part of the town of Cawsand open clears to to the N. The Romish ch. spire open of Redding Pt., N.E. ¼ N., is a prominent mark for clearing the reef.

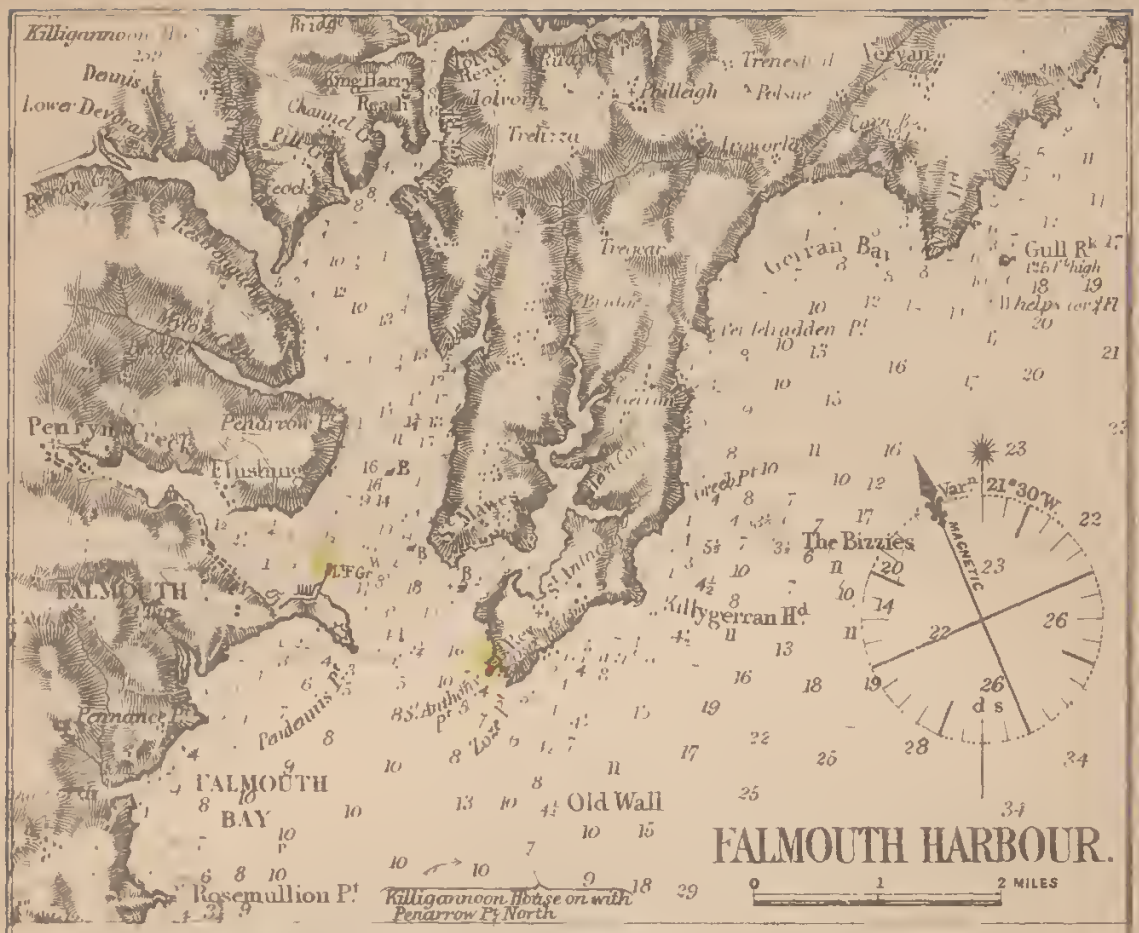
The **Knap** is the S., and the **Panther** the N. part of a shoal of sand and rock, ⅓ m. long, N.E. by E. and S.W. by W., with 20 ft. least water over the shoalest heads, and 5 to 7 fms. between. Its N. and S. extremes are each marked by a *black* buoy.

Tinker shoal, ¼ m. long E. and W., and ⅛ m. broad, has 15 to 20 ft. water over its rocky patches. Its E. and W. extremes are marked by a *white* buoy.

Several rocky **4-fms.-patches** lie between Tinker and the E. end of Breakwater. Two of them, near the middle of E. channel, are marked by *chequered black* and *white* buoys.

Mewstone ledge extends S.W. 1½ cables from Little Mewstone, and its outer edge is marked by a conical *red* buoy. The Shagstone on with Breakwater beacon, bearing N., leads 2 cables W. of ledge.

* Under the management of Mr. Cox, Optician and Admiralty Chronometer Agent, Devonport.



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Shagstone is a square-headed rock 9 ft. above H.W., lying N.N.W. ½ W. 1 m. from peak of Mewstone, and ⅙ m. outside Reny islet. It stands on outer edge of a rocky ledge, which, N. of Shagstone, extends ½ m. off shore. On outer extreme of this ledge are two *red* buoys, which mark (to vessels of large draught) the eastern side of East channel into Plymouth Sound.

DANGERS INSIDE BREAKWATER.—Duke rock is the outer part of a shoal extending ⅓ m. from E. shore of Sound The least water on the rock is 18 ft., which is a short distance S.E. of the *white* buoy moored in 5 fms. near its outer edge, ⅓ m. N.N.E. ½ E. from Breakwater beacon.

Queens Grounds are rocky patches of 3 to 4 fms. lying 4 cables N. by W. of Breakwater Lt.-ho. A *red* buoy marks their S.E. extreme.

New Grounds are patches of 29 ft. least water. A *red* buoy marks their S. side, about 4½ cables N.E. of Breakwater Lt.-ho.

The **Bridge** is the rocky reef connecting Drakes Id. with Redding Pt. The tower on Devils Pt. in line with cupola on St. Johns chapel, Devonport, N. ¼ W., leads over the reef in 22½ ft. at H.W., and 7 ft. at L.W. sps. This, the deepest part of the channel, is marked by two small beacon buoys, the inner one *white*, the outer one *red*. Pass closely on either side of the buoys, as the channel is narrow. If blowing hard from the S. *no boat or vessel should attempt it after ½ ebb.*

Dunstone rock, with 19 ft. on it, and 4 fms. close to, lies W. 2 cables from Dunstone Pt. on E. side of Sound. *Marks :*—Plymouth new ch. on with W. side of Fishers Nose, N. by E. ¼ E., and Obelisk on Mount Edgecumbe on with N. extreme of fort on Drakes Id., N.W. ¾ W.

Melampus shoal, the S.E. extreme of ledges extending from Drakes Id., is marked by a *black* buoy.

Asia shoal, the N.E. extreme of these ledges, is marked by a *white* buoy.

Winter shoal is a rocky knoll of only 10 ft. water, midway between Drakes Id. and Mount Batten, and within the 3 fms. depth it is nearly square, about ½ cable across. A *striped red* and *white* buoy marks its N.W. edge; a *chequered red* and *white* buoy its N.E. edge; and a *red* buoy its S. edge.

Mallard shoal, also rocky, of 12 ft. water, and 4½ to 6 fms. on all sides, lies about a cable E. of Winter. A *black* buoy marks its N.W. extreme.

Cobbler ledge, extending 1½ cables from Mount Batten shore, has a *black* buoy in 2½ fms. on its extreme edge; but N.E. ½ a cable from the buoy is only 6 ft. water.

Drakes Id. flat, of sand and mud, extends ½ way from the N. side of Drakes Id. to the opposite shore. From its N. edge in 4½ fms., the N. extreme of Wilderness Pt. is on with the S. extreme of Bottle-nose Pt., W.N.W. The whitewashed mark in Barn pool on with the S. turret of Mount Edgecumbe ho., just leads N. of the flat. A *black can* buoy, in 10 fms., marks the extreme of ledges extending from N.W. part of Drakes Id.

Vanguard and **German** rocks are the highest heads of rocky patches

extending S. 2 cables from Devils Pt. The German, ⅜ cable from the Pt., has only 2½ ft. over it. The Vanguard, with 18 ft. over it, lies nearly in mid-channel, with Mount Wise flagstaff in line with the centre of the tower on Devils Pt., N. ¾ W., and the Camera mast on the Hoe on with S.W. angle of West Hoe terrace, E. ¾ N.; a *black* mooring buoy in 5 fms. marks its S. side. A remarkable tree on Wilderness Pt. on with the Obelisk on Mount Edgecumbe, leads between German and Vanguard.

Cremill shoal, of 1¼ to 2 fms., extends a cable from the ferry on Cremill Pt. A *conical black* buoy in 5 fms. marks its N.E. Extremo. To clear the shoal, on entering Hamoaze, keep Breakwater Lt.-ho. open of Ravenness Pt., S. ¾ W., until the first building at Southdown opens of Cremill Pt., W.

Rubble bank is a ledge of slate rocks, extending to mid-channel from the S.W. Pt. of the dockyard, and its shoalest head of 3 fms. is named Pollock rock; a *black* buoy in 5 fms. marks its W. extreme.

Devonport monument in line with entrance of mast pond, N.E. by E. ¼ E., leads E. of Rubble; the S. side of Drakes Id. *touching* Cremill Pt., S.E. ¼ E., leads S.; and the Dockyard chapel tower open N. of Master Attendant's office, N.E. by E. ¼ E., leads N.

DIRECTIONS FOR PLYMOUTH SOUND.—Standing towards the Sound in thick or foggy weather (for tides, see page 20), recollect that the line of 20 fms. soundings at L.W. extends along parallel with the coast, passing ¾ m. outside Rame Hd., the Mewstone, and Stoke Pt., and 2½ m. outside the Breakwater. The W. channel into the Sound is nearly ½ m. wide, carries 6 to 9 fms. at L.W., and can be used at all times of tide. The E. channel should not be attempted at night, and never by large vessels without a fair wind or steam; for its 5-fms. channel is narrowed to 80 yds. in some parts by rocky 4-fms. patches, and S. winds cause a considerable scend of the sea.

THROUGH WEST CHANNEL. *Entering from the W.*—To clear Draystone, give Penlee Pt. a berth of at least ¼ m. in rounding, or keep the whitewashed mark on Bovisand pier-hd. open S. of Breakwater beacon, E. by N., until Mount Batten tower comes in line with Breakwater Lt.-ho., N.E. by E. ¼ E.; this latter mark will lead a cable E. of Draystone buoy, the same distance W. of Knap buoy, and clear of all danger towards the W. end of Breakwater, to which give a berth of a cable. Or having cleared the Draystone, steer in with the spire of Plymouth new ch. (Charles ch.) on with the Obelisk on the Hoe, N.E. ½ E., and when abreast the Breakwater haul to the E. for the anchorage.

Working through.—When standing towards Draystone do not open Mount Batten tower W. of Lt.-ho. Standing towards Knap and Panther, do not open that tower E. of Lt.-ho. Working through Cawsand bay, in a large ship, stand no nearer than ¼ m. of S. shore, nor farther W. than to bring W. end of Drakes Id. touching Redding Pt.; having passed N. of line of Lt.-ho. and Breakwater beacon in one, keep a good ½ m. off shore. Working along the S. side of Drakes Id., keep the whole of Cawsand open of Redding Pt.

To run between W. end of Breakwater and Panther, in not less than 7 fms

water,—keep the north H.W. Pt. of Mewstone on with Shagstone, S.S.E. ¾ E.; the same mark leads N. of Tinker, in not less than 4 fms.

Entering the Sound from the E.,—after passing Mewstone ledge, by keeping Bolt Hd. open S. of Mewstone, S.E. ¼ S., the vessel will pass S. of Tinker and Knap. Bolt Hd. shut in with Mewstone, ranges closely upon the tails of both Tinker and Knap. The Gamekeeper's cottage, in the valley below Maker heights, on with Maker ch., N. ½ W., leads 2 cables S.W. of Knap, and when spire of Plymouth new ch. comes on with Obelisk on Hoe, N.E. ¾ E., proceed as before.

AT NIGHT,—stand in with Eddystone Lt. bearing S.W. ¼ W. until *red* Lt. in Breakwater Lt.-ho. is seen; then run for the *red* Lt. on a N.E. by E. ¼ E. bearing until the *white leading* Lt. is seen, when the W. channel will be open, and *keeping the leading* Lt. in sight, steer direct for it. (See p. 97.) After rounding the Breakwater, haul to the E., but do not anchor till the upper Lt. has fully changed from *red* to *white*, which it will do when it bears S.W. ½ W.

THROUGH EAST CHANNEL. *From the E.*—Breakwater beacon on with Shagstone, bearing N., leads 2 cables W. of Mewstone ledge in 11 fms. The best mark to clear Mewstone ledge and to lead direct to entrance of East Channel is, Picklecombe fort open W. of Breakwater Lt.-ho., N. by W. ½ W. Keep this mark on until the Obelisk on the Hoe is on with Breakwater beacon, N. by E. ¾ E., which will lead between Tinker and Shagstone, and between the shoals on either hand direct to E. end of Breakwater, in not less than 5 fms. at L.W., passing W. of the two *red* buoys, and E. of the two *chequered black* and *white* buoys. Give the Breakwater a berth of a cable in rounding, then steer N.W. for the anchorage, taking care to avoid Duke rock.

To steer direct for E. end of Breakwater from the westward in not less than 5 fms., keep the centre of N. round tower of Staddon fort in line with flagstaff on Bovisand pier, E. by N. ¼ N.

DIRECTIONS FOR HAMOAZE.—Hamoaze* is entered by two channels, one carrying 12 to 15 fms. between Winter and Mallard, the other 4 fms. between Winter and Asia. Gill's soap factory chimney ranged from end to end of West Hoe terrace, marks the limits of the channel between Winter and Asia, and this channel is generally taken by large vessels, except at dead L.W. sps.; the other is deeper, but the turning is sharp, and winding a long ship difficult. A sailing vessel will lie through either channel into Hamoaze with the wind from S. by W. (round south) to E.; and may go from Hamoaze to the Sound without tacking with the wind from W. (round north) to N. by E.; but remember that at near ½ flood the tide runs strong, particularly between Cremill and Devils Pts., so that the greatest caution is then necessary.

The tides are tolerably regular in the Sound, running about 6 h. each

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* The *Pilotage* for Hamoaze is required only from Officers passing for 1st Class Ships.

way. At the Breakwater it is H.W. about a quarter of an hour earlier than at the Dockyard. The range of tide is greatly influenced by the wind; southerly gales raise the water from 2 to 3 ft. above its ordinary level, whilst northerly winds cause a corresponding depression.

The flood runs up fair between the Asia and Winter, tending rather to set over the former. From the Vanguard it sets towards Barn pool, and from thence towards the fair channel for Mount Wise; it then takes the fair course of the harbour. Leaving Hamoaze on the flood, be guarded against the tide which sets strong from the Vanguard towards Barn pool, for vessels attempting to round the Vanguard are often caught by the flood on the port bow, and although meeting it quickly with starboard helm, are set into Barn pool even into the eddy.*

The ebb, from off the dockyard, sets directly from the Rubble bank towards Millbrook lake, so that vessels leaving Hamoaze on the ebb must be careful not to be set over to the flag-ship before they can recover their course. From Mutton cove it runs towards Devils Pt., and then strong over Vanguard. The eddies within Vanguard and off Devils Pt. are very strong.

Proceeding through either of the above channels from the Sound, steer to the N.E., keeping the town of Cawsand open of Redding Pt., till the Obelisk on the Hoe is in line with the diamond mark on the H.W. rock under the Hoe, N. by E. ½ E.; this leads between Winter and Mallard; or, if using the channel between Winter and Asia, Gill's soap factory chimney in line with centre of W. Hoe terrace, N. ½ W., leads through.

Keep either of these marks on until Mount Edgecumbe obelisk is on with the second embrasure in Western King fort, W.N.W., which leads in fairway N. of Drakes Id., until S.E. angle of Esplanade terrace (on the Hoe) is on with S.W. angle of West Hoe terrace (under the Hoe), E. by N. ¼ N. Then haul to the S.W., and proceed with this latter mark on between Drakes Id. and Vanguard rock, until E. extreme of Cremill quay is nearly on with Wilderness Pt., N.N.W. ½ W., or Mount Wise comes well open of Devils Pt. about N. ½ W.; then *hard-a-port* to bring the cupola of St. Johns chapel (Devonport) on with flagstaff on Mount Wise, bearing N.; this leads in mid-channel between Devils and Cremill Pts. The pilots, however, after rounding Vanguard, usually keep over towards Mount Edgecumbe battery, to avoid the strong eddy on the flood caused by Devils Pt. and foul ground off it; remembering that to clear Cremill shoal the Breakwater Lt.-ho. must be kept open of Ravenness Pt., S. ¾ W.

When Drakes Id. is shut in with Devils Pt., or when the first building at Southdown is open of Cremill Pt., bearing W., the vessel will be N. of Cremill shoal, and may run up the harbour, but take care on nearing the

* The last hour of the flood is the best time for large long ships to go into Hamoaze; but guard against the eddy which at that period sets strong round Devils Pt. and over the German.—Commander J. Brown, R.N., Master Attendant, H.M. Dockyard, Devonport, 1863.

Rubble to keep the S. extreme of Drakes Id. touching Cremill Pt., S.E. by S., or the flagstaff at N.W. angle of Victualling yard, on with western (or Brewery) chimney in Victualling yard, S.E. by E. ¼ E.; either of these marks will lead S. of Rubble, and when the tower of Dockyard chapel opens N. of Master Attendant's office, N.E. by E. ¼ E., either anchor or proceed farther up the harbour.

DIRECTIONS FOR CATWATER.—The assistance of a pilot or local experience is requisite to enter Catwater, for the anchorage space, being generally filled with vessels, prevents the leading marks from being followed; neither would it be prudent for a stranger to enter at night. The bottom all over Catwater is mud, and the general depth from 2 to 3 fms.; there is a narrow channel of 3½ fms. leading to a deep hole near the Turnchapel rock, where moorings are laid down, and 16 large ships can moor in tiers.

The spire of St. Johns ch. (Plymouth) in line with Fishers Nose, N.E. ½ E., leads through the 4-fms. channel between the Mallard and Cobbler. The ruin (it would appear to a stranger like a small tree) in Mount Edgecumbe park kept between the two barracks on the W. end of Drakes Id., W. ½ S., leads through the 4-fms. channel between the Mallard and Citadel. Keep the latter mark on, passing Fishers Nose, which is bold-to, at about 100 yards, till the lamp-post on W. Barbican pier-head bears N.; then steer E.S.E. till St. Andrews ch. tower is in line with the above lamp-post, or with H.W. mark on rocks under Queen Anne Battery, N.N.W. ½ W., which leads to deepest water (5½ fms.) off Turnchapel.

RIVER TAMAR receives near its mouth the waters of the Tavy on left bank, and those of St. German on right bank. The Tamar is tidal 16 m. to Weir Hd., which is a wall 100 ft. long, 15 ft. wide, of large stones, held together by iron clamps, and is partly dry when the river is in a very low state. At H.W. sps. vessels of 5 ft. draught can reach the entrance of the canal at ¼ m. below Weir Hd. On the right bank, 4 m. below Weir Hd., is Calstock village; here the river is navigable for vessels of 12 ft. draught at H.W., and for boats only at L.W. sps.

The Tamar has only 10 ft. in it at L.W. at its junction with the Tavy. The Tavy is tidal for 5 m., up to the falls, which may be reached by vessels of 5 ft. draught at H.W. sps.; those of 8 and 10 ft. draught unload at Mariston quay, ½ m. lower down. The St. German is tidal for 6¾ m., to Tideford, which may be reached at H.W. sps. by vessels of 6 ft. draught.

PLYMOUTH TO START.

RIVER YEALM has its entrance in the N.E. part of Wembury bay at the commencement of a long E. range of cliffy shore. This bay, with 4 to 8 fms., rock, sand, and gravel in it, is only used as a roadstead for vessels bound into the river. Vessels drawing 12 ft. and waiting tide, should not go inside the line of entrance Pts. of river; for ¾ m. within the entrance the depth is only 9 ft. at L.W., and then 10 ft. for 1¼ m. to Stert Pt. At Stert Pt. the river is

too shallow at L.W. even for boats, and it here divides into the Cofflet and Yealmpton arms, which have 10 ft. in them at H.W., but are too shallow to float a boat at L.W. Coal barges of 5 ft. draught get up to Kitley quay. Newton Ferrers arm has the same depth as the other arms.

Sps. rise 16¼ ft., nps. 11½ ft. The greatest range is 19 ft., the lowest 5 ft. During the freshes the stream runs 4 kts. abreast Warren Pt.; at other times 1¾ kts. on flood, 2¼ kts. on ebb.

DIRECTIONS.—Entering Wembury bay, beware of the Slimers reefs on the W. shore, also the Church ledge extending from the N. shore under Wembury ch., and the Ebb rocks and Mouthstone ledge on the E. shore. Do not attempt to enter during S.W. winds, as frequently a line of breakers extends across from the Slimers to the Ebb rocks.

Wembury ch. bearing N.E. leads into the bay clear of all danger, until the small hummock on high extreme of Warren Pt. is E. by S., and over extreme of Misery Pt. The latter mark leads to entrance of river, ⅓ cable N. of Mouthstone ledge. The channel then (40 yds. wide) is between the sand-bank projecting from N. shore, and shore of Cellar bay; the deep water line to this bay is along S. shore. The mark to lead through the above channel is coast-guard hut on Warren Pt. kept open of Misery Pt. This channel ends at the latter Pt., off which a 3-ft. shoal extends 70 yds. At Misery Pt. the channel of the river deepens to 12 ft., and is on the N. shore; thence the deepest water is 10 and 12 ft. to best anchorage in 9 to 12 ft., in centre of channel between Ferry ho. and Newton Ferrers arm. Guard against the flat off Warren Pt.

STOKE PT. ROCK, lying ½ m. S. by E. from Stoke Pt., and 3½ cables from the nearest shore, has 8 ft. on it, 11 fms. close to its S. side, and 8 to 4 fms. between it and the land. The two beacons on the shore abreast in one, N.E. by N., point to the rock; and by keeping them open a vessel will pass clear of it on either side. The town of Cawsand open S. of the Mewstone, N.W., by N. leads outside it.

BIGBURY BAY is exposed to the full force of S.W. gales, but in fine weather its coast may be safely approached by vessels for smooth water or to avoid the offing tide, as there are no dangers *outside* ½ mile off shore. The least water is in E. part of the bay, where in thick weather do not shoal to less than 7 or 8 fms. at L.W. In W. part of the bay there are 19 fms. at ¾ m. off shore near Stoke Pt.; farther westward do not shoal to less than 10 fms.

RIVER ERME is recognised by the wooded clumps over the white coast-guard just within the island-shaped W. entrance Pt., and by the solitary Pilot's ho. inside Muckstone Hd., the E. entrance Pt. It is only navigable for vessels of 9 or 10 ft. draught (when the water is smooth) to the distance of 6 cables within the *bar*, which dries at L.W. Coal barges can thread their way 2½ m. within the entrance.

DIRECTIONS.—Do not attempt to enter the Erme when there is any swell to make broken water on the bar. At 4 cables outside the bar are the Merry reefs, which dry at L.W. nearly across the entrance from E shore. At 2 cables outside them is Edwards rock, of 5 ft. water. The Pilot's ho. its own

breadth open of Muckstone Hd., and in line with Kingston 4 firs (a solitary group on a high back ridge) leads safe towards the bar, W. of Edwards rock, and between Merry reefs and Roadstead Pt.

WELLS ROCK, of 5 ft. water, and the most outlying danger off this coast, lies ½ m. off shore between the mouths of the Erme and Avon, with Ringmore ch. over the W. corner of a small sandy beach, E. ¼ S., and the summit of Borough island S.E., distant 1½ m.

RIVER AVON.—The coast between the Erme and Avon is composed of whitish cliffs 200 to 300 ft. high, their base fronted with ledges and rocks. Near the Avon the cliffs are lower, and separated by small bays with sand and shingle beaches. Borough island (connected at L.W. by a sandy neck to the W. entrance Pt. of the Avon) is high and rounded, and quite a finger-post for this part of the coast; extending 2 cables from its E. Pt. is a rocky ledge, dry at L.W., and a cable from the extreme of this ledge is a *dangerous* rock, called Blind Mare.

The Avon is so far like the Erme, that it has nearly a dry *bar*, cannot be entered with any swell on, and is only navigable for 9 or 10 ft. draught; but its navigation is much more difficult from the strength of the tides, also from its bar extending farther out, and from a sandy tongue projecting from the high, dark, cliffy E. Hd. nearly to the high precipitous bend of the shore close within the W. Hd. Coal barges discharge at Aveton Giffard, but limestone and coal vessels seldom go above Bantham, 1 m. within the entrance. These vessels often lose weeks waiting for a fair wind to get out.

HAMSTONE rock, 10 ft. above H.W., lies ¼ m. off shore, midway between Bolt Tail and Bolt Hd., and a little E. of the beach of Mill Bay cove, the only beach near; there are sunken rocks near it.

GREGORY rocks, with 9 ft. over them, lie ½ m. E. of Hamstone, and ½ m. off shore. The ruin of the signal ho. on Praul Pt. open S. of the Little Mewstone (off Bolt. Hd.), S.E. by E. ¾ E., leads S. of them; but keep outside this mark, as there are dangerous rocks in this space.

SALCOMBE HARBOUR has well-sheltered anchorage, and is a good place of refuge, but is not sufficiently known to strangers. The least water on the bar at entrance is 7 ft. at L.W. sps., and vessels drawing 22 ft. can cross it (*when the sea is smooth*) at H.W. sps., and those of 16 ft. at H.W. nps. In S. gales a breaking heavy sea must be allowed for in crossing. Sps. rise 15 ft., nps. 11½ ft., and nps. range 8 ft.

The anchorage in the Range, about 3 cables outside the bar, is in 6 and 7 fms., sand and shell, with Woodville ho. on with Lambury Pt. N.N.E.; but weigh immediately should it come on to blow from the S. Pilots are in attendance at entrance, and should be taken by strangers.

DANGERS.—Rickam rock, of 11 ft. water, is ¼ m. off E. shore of Range. **Wolf** rock, on E. side of channel within the bar, dries at L.W. sps., and on its W. side is moored a *red* buoy. **Poundstone** rocks are on W. side of channel, and their summit, which covers at 12 ft. rise of tide, is marked with

a *white* ball *beacon*. There is also a *white* ball *beacon* on **Old Harry**, which is the extreme of rocks extending from Sandhill Pt., and covers at 6 ft. rise; and there is another *white* ball *beacon* on **Mort Tail** rock, the E. extreme of rocks off Fort Charles. **Blackstone** rock, on E. side of channel, covers at H.W. sps., and on its W. end is a *red* ball *beacon*. Between Old Harry and Blackstone the channel is 120 yards across.

DIRECTIONS.—The stream sets fairly in and out of Salcombe; sps. run 2½ knots. To cross the bar in deepest water, keep well over on W. shore, and steer in with Great Eelstone and Great Mewstone in one astern. When across the bar steer up mid-channel for the *red* buoy of the Wolf rock, passing to the W. of it, also to the W. of the *red* ball *beacon* on the Blackstone, when keep in mid-channel between the *red* beacon on Blackstone and *white* beacons on Poundstone and Old Harry, and proceed up to anchorage off the town.

Should the beacons be washed away, after crossing the bar, bring a small thatched summer ho. (in trees) on Sandhill Pt., on with W. side of Charles fort, N.E. by N., and keep this mark on until the whole of Southsand bay is open, then bring the thatched summer ho. on with E. side of Charles fort, and keep it so, until Portlemouth Ferry ho. is on with W. extreme of Scoble copse, E. by N. ¾ N.; this leads in the only channel nearly up to Woodville ho.; then keep in mid-channel to the anchorage.*

START TO BILL OF PORTLAND.

VARIATION, 21° TO 20° 30′ W.

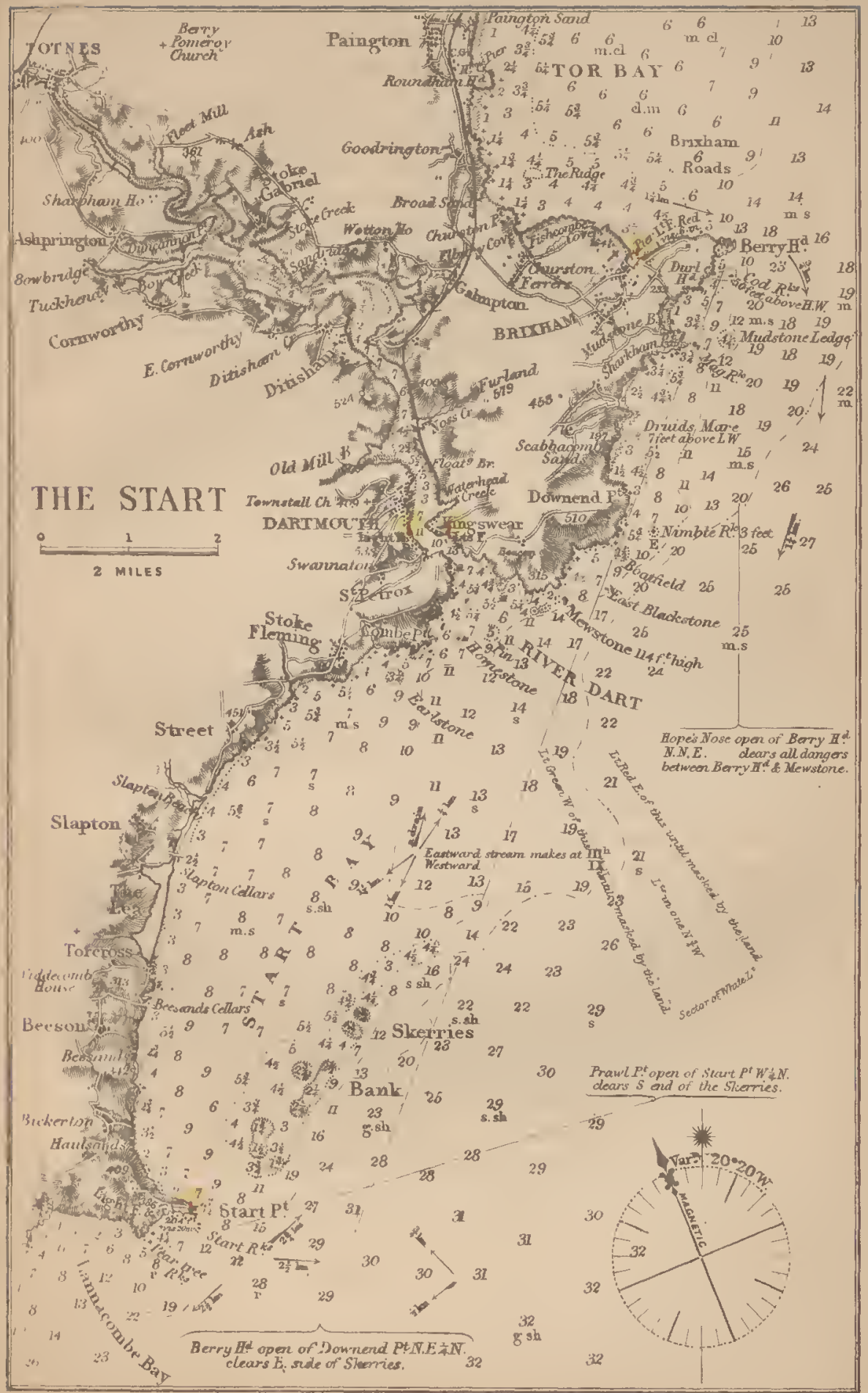
MAKING THE LAND.—The Start will be recognised from the offing by its rugged cocks-comb-like appearance, and by the white granite Lt.-ho. (*fixed white Lt.*, varied *every minute* by a *brilliant flash*), 140 yds. within its S.E. extreme (see page 98). The five hillocks on the ridge within the Lt.-ho. are each 200 ft. above H.W.

The coast from the Start towards Dartmouth is generally low, rising gradually in the interior. The most remarkable of the peaks which break the outline of the Dartmoor range are named Hay Tor and Rippon Tor; the latter, 1,525 ft. high, has a single culminating Pt., while Hay Tor has a jagged appearance. Rippon Tor, N. ½ W. leads to the entrance of Dartmouth.

The land from Dartmouth to Berry Hd. is high and undulating. The cliff at Downend Pt. is 203 ft. high, and at ½ m. in the interior the land rises to 510 ft. Berry Hd. is a limestone cliff with flat summit, steep-to, 180 ft. high, and visible 20 m. off.

ROCKS off START.—Off the S. and S.W. sides of Start Pt. are the Pear-

* Additions to 1874 by Mr. J. H. Hill, Harbour Master.



Malby & Sons, Lith

tree, Start, and Cherrick rocks. The two former are close to the shore; the latter, awash at L.W., lies 2 cables S. ¾ W. from the Pt. A rock with 12 ft. on it lies 2 cables S.E. ½ S. from the Lt.-ho.

SKERRIES.—The S. extreme of this dangerous bank of sand and gravel is nearly 1 m. E. ¼ S. from Start Lt.-ho. From thence the bank extends N.E. by E. ¾ E., 3¼ m., with an average breadth of ½ m. Near its S. extreme is only 9 ft. water, 2 to 4 fms. on other parts, with deeper casts between. Its N.E. end terminates in a sand-bank, 1 m. long, with 3 fms. on it. In bad weather the sea breaks on all parts of Skerries, particularly on S.W. end.

Clearing Marks.—Berry Hd. open of Downend Pt., N.E. ¼ N., leads E. of Skerries.—Praul Pt. open of Start Pt., W. ¼ N., clears S. end.—Street ch. on with high part of Street-hd. cliff, and little open of N. end of Slapton beach, N.N.W. ½ W., clears N. end. In thick weather do not shoal towards the bank into less than 30 fms. at L.W. There is 20 fms. at only ¼ m. outside the Skerries.

Mewstone peak (Dartmouth) just open of high land of Downend Pt., N.E. by E. ¼ E., leads between the Skerries and the land. The W. end of trees over Widdecomb ho. in line with N. white ho. in Beesands, N. by W. ¾ W., leads between Start and S.W. end of Skerries. To pass between Skerries and the land at night, keep the *fixed* Lt. (which is 12 ft. below flashing Lt., see page 98) S.W. ¾ S., and round Start Pt. at ¼ m. on its N. side, and ½ m. on its S. side. When the Lt. bears W.N.W., the vessel will be S. of the Skerries.

START BAY, within the clearing marks for Skerries, affords good anchorage in 7 to 8 fms., sand and gravel, except in strong E. winds, when a heavy sea is thrown in. Do not anchor within ½ m. of Start Pt., as the bottom there is rocky. Start Pt. shelters with the wind W. of S.W. Earlstone rock, of 3¼ fms. water, lies in the N. part of bay, ½ m. W. by S. ½ S. from Combe Pt.

DARTMOUTH HARBOUR (at 7 m. N.E. of Start) has dangerous rocky patches outside the entrance, but it can be taken at any time by sailing vessels with the wind from E. (round S.) to W.S.W., and ships can run in during the heaviest gales. The erection of the new Lt.-ho. and *day-beacon* have much facilitated entering; for the Lt. shows *white* in the fairway towards the entrance (see page 98); *red* on E. side of fairway until masked by the land; and *green* on W. side of fairway until masked by the land. From the entrance up to the town is also marked by a small Lt., which shows *white* in the fairway; *red* between fairway and N. shore; and *green* between fairway and S. shore. The entrance is only 220 yds. wide, but it is bold and easy of approach, and the harbour has capacious and sheltered anchorage in 7 to 10 fms. Pilots are always on the alert. A powerful steam-tug is always in attendance; and there is a coal hulk for supplying steam-vessels with coals. Vessels drawing 14 ft. can discharge afloat alongside the railway wharf. There are two patent slips, 450 and 250 ft. in length, and a gridiron.*

* Additions to 1874 by Mr. G. Pepperell, Harbour Master.

With the wind from E. by N. (round N.) to W.N.W., a vessel can always anchor in the Range, outside the harbour, for it has good holding ground, 5 to 7 fms. water, with little tide; it is, however, open from E.S.E. to S.S.W., and with S. gales on the ebb the sea breaks heavily across it; but with these winds a vessel can always run in.

LANDMARKS.—The tall square tower of Stoke Fleming ch. on the high ground 1¾ m. S.W. of harbour's mouth. Mewstone islet, 125 ft. high, at 1½ cables off shore, on E. side of entrance. An octangular *day-beacon* of gray granite, 80 ft. high, on the land about 500 ft. above the sea, N. by W. ¼ W., distant 6 cables from Mewstone. A stone Lt.-tower, 36 ft. high, on N. shore of harbour, facing the entrance. St. Petrox old ch., on Battery Pt., the W. Pt. of entrance; and Kingswear (a white ruin) castle, on E. Pt. of entrance.

DANGERS ON W. SIDE OF ENTRANCE.—Combe rocks, uncovered at L.W., extend a long cable off Combe Pt. Outer Combe dries at ½ ebb, has deep water all around, and when seen can be safely approached. Old Combe, distant ½ a cable to the W., is always above water. **Mag** rocks, lying ¼ m. N.E. by N. from Outer Combe, show at ½ ebb.

Homestone rocks, ¼ m. E.S.E. from Combe Pt., have 4½ ft. over highest Hd. A *buoy*, painted in *black* and *white rings*, lies nearly a cable S.E. by E. of rocks.

Pin rock, lying ⅓ m. E. of Homestone, has 30 ft. over it.

Blackstone rock, 8 ft. above H.W., and lying a cable S. by E. ½ E. from Blackstone Pt., has a sunken rock 80 ft. off its E. side: and there is a shoal Hd. of 5 ft. nearly in mid-channel between it and the Pt. Small vessels can use this channel at H.W. by keeping closer to Blackstone rock than to the Pt.

Checkstone, with only 1 ft. on it, is the outer rock of a group extending ⅔ cable off shore, a little S. of Battery Pt. A *black* and *white chequered* buoy is moored about 100 ft. eastward of it.

Clearing Marks.—Kingswear castle open of Blackstone Pt., N.E., ¼ N., leads E. of Mag and outer Combe.

Kingswear castle open E. or W. of Blackstone rock, leads on either side of Homestone; and Stoke Fleming ch. kept 2° within S. extreme of Combe Pt., leads close to S. side. St. Petrox ch. just open of Blackstone Pt., N. by E., leads ½ cable E. of the 17-*feet patch* lying about ½ a cable N. by E. of Homestone buoy.

There being only 13 ft. outside Checkstone buoy, a vessel of large draught should not approach it nearer than to have Kingswear Pt. touching Battery Pt., N. by W. ¾ W.

DANGERS ON E. SIDE OF ENTRANCE.—Mewstone is steep-to on E. side. If the vessel is carried by the tide between the Mewstone and the shore, keep her in mid-channel, as rocks extend off both sides.

Verticals are a chain of rocks (some dry at low water), extending W. upward ¼ m. from Mewstone. The W. rock dries at very low tides. Give them all a *wide* berth, as they are steep-to, and the lead will be no guide.

Bears Tail rock, at ½ a cable S. of Outer Forward Pt., dries at L.W. Kettle and Inner Forward Pts. in one lead over it.

Castle Ledge.—Old Castle rock, of 4 ft. water, is the inner of two shoal Hds. of a rocky bottom lying upwards of ¼ m. S.W. of Inner Forward Pt. Castle ledge, the outer Hd. of only 8 ft. water, lies ½ cable within or E.N.E. of the *black buoy* that marks it.

Clearing Marks.—Kingswear castle open of Inner Forward extreme Pt., N.N.W., leads W. of Verticals.

Mewstone peak open of Shooter islet, leads S. of Castle ledge; and to pass W. of it, keep the castle flagstaff on with the house on Mount Boone, or Battery and Kingswear Pts. touching, N. by W. ¾ W.

East Blackstone kept ½ a point open of Mewstone, E. ¼ N., leads S. of Verticals, Pin, Homestone, and Combe rocks.

DIRECTIONS.—The eddies at the entrance, and the baffling winds off the islands, cause some difficulty both in entering and leaving Dartmouth, and no square-rigged vessel should attempt it without a leading wind. N.W. and S.E. are the true winds; and in leaving, a vessel will be well under command if the wind is between N.W. by N. and N.N.E., and in entering if it is between S.W. and S.E.

As before noticed in p. 30, Rippon Tor N. ½ W., leads towards Dartmouth. Having made out the entrance, steer for the *day-beacon* on a N.E. by N. bearing, until the Lt.-ho. bears N. ¾ W. The Lt.-ho. kept on this bearing will lead in. Or, keep St. Petrox castle in line with the large ho. on Mount Boone, or Battery Pt. touching Kingswear Pt., N. by W. ¾ W., until about a cable distant from Checkstone buoy, when steer for middle of entrance. Recollect that a small rock lies under St. Petrox castle; a 3-ft. rock close to Kettle Pt.; and that the Kettle rock, which dries at L.W. to the N. of this 3 ft. rock, is about 60 ft. from the shore.

Bound from the E., keep the East Blackstone (see p. 34), open of the Mewstone, E. ¼ N., until the fairway marks come on.

With scant W. winds the channel may be used between the Combe and Homestone; but attend to clearing marks for Combe, Homestone, and Mag.

Small vessels can pass between the Old Castle rock and the land, by keeping Beacon hill on with Kingswear castle, N.N.W., which clears the Verticals and the Bears Tail, and leads inside Old Castle rock.

AT NIGHT.—The *white* Lt. shown from the Lt.-ho. is only seen between the bearings of N. ⅜ W. and N. by W. ¼ W., and by keeping within these limits a vessel will be in the fairway channel towards the entrance. (See p. 98.) The above Lt. is visible 11 m. in clear weather, and kept in line with the *white leading* Lt. shown from the flagstaff 110 ft. seaward of the Lt.-ho., bearing N. ¾ W., leads in the middle of the fairway channel. By not opening the *red* Lt. the dangers will be avoided on starboard hand in entering; and by not opening the *green* Lt., those on the port hand. Having arrived within the entrance, the small Lt. shown near the coast-guard station at S. part of town will be

seen. This Lt. shows *white* in fairway towards the town, *red* between fairway and N. shore, and *green* between fairway and S. shore; but the *white* Lt. will not open out in entering until Gun Pt. shoal can be cleared.

It will thus be seen that by keeping the *white* Lt. in sight a vessel will be in the fairway channel towards the entrance, and also towards anchorage within the harbour; and by not opening the *red* Lt. she will avoid the dangers on starboard hand; and by not opening the *green* Lt., those on the port hand.

Leaving in light winds, take care, when near Outer Forward Pt., the flood stream does not set the vessel either on the Verticals or inside the Mewstone. She will be in safety when the East Blackstone opens S. of Mewstone, which latter may be rounded at a ship's length.

The *flood* at ½ m. outside the Homestone sets S. of Mewstone. From the Homestone it runs towards Inner Forward Pt.; it then turns to the S., and runs inside Castle ledge and Mewstone. The flood splits at the Blackstone, and then curves sluggishly towards entrance of harbour.

The *ebb* sets S. from the entrance until past Castle ledge, where it mingles with the offing ebb, and is deflected to the W. outside the Homestone.

Between DARTMOUTH and BERRY HD. the shore is dangerous to approach within ½ m., there being the following rocks, steep-to:—

East Blackstone rock, 10 ft. above H.W., lies 1 m. S.W. by S. from Downend Pt., with no outlying dangers. **Bootfield** rock, of 9 ft. water, lies 2 cables off S.E. extreme of Downend Pt. **Nimble** rock, of 3 ft., lies ⅓ m. off shore, a little S. of Downend Pt. **Mudstone** ledge, with 4½ fms. on outer end, is 1 m. S.S.W. ½ W. from Berry Hd. **Cod** rocks are two steep rocky islets, 50 ft. above H.W.; the outer rock is ⅓ m. S. by W. ¾ W. from Berry Hd., and ¼ m. off shore; there is no channel between them and the land.

The tide turns in-shore 1 h. earlier than in the offing.

Clearing Marks.—A projecting rocky Pt., ½ m. S. of Sharkham Pt., open of Downend, N.N.E. ¾ E., leads E. of Bootfield. Start Lt.-ho. open E. of East Blackstone, leads. E. of Nimble, and open W. leads between it and the land.

Hopes Nose well open of Berry Hd., N.N.E., leads *outside all* danger between Dartmouth and Berry Hd.

TORBAY has good anchorage in 6 and 7 fms., mud and clay, sheltered from N.E. (round by N.) to S. by W., and even to S.S.E. if a berth be taken up in S. part of bay; but it is open to S.E. gales, which throw in a heavy sea. Brixham road, however, having an underset (as in Mounts bay) to windward, which strengthens with the wind, affords easy riding. The only foul ground is the **Ridge**, a small rocky patch of 3¼ fms., from which the Thatcher is on with Hopes Nose, N.E. by E. ½ E., and Smoky House mill (a ruin) is on with the W. fall of a red cliff on S. side of Roundham Pt., N. by W. ¼ W.

Brixham, Paignton, and Torquay harbours have each 10 to 15 ft. in them at H.W. sps., 6½ to 11½ ft. at H.W. nps., and dry out at L.W.; neither should be run for with on-shore gales. A breakwater, which shelters small craft, extends 700 ft. from the land, about ¼ m. E. of entrance of Brixham. A *fixed*

red Lt. is shown on E. pier-hd. of Torquay, and a similar Lt. on Brixham W. pier-hd.

DIRECTIONS.—Entering Torbay from the S.,—round Berry Hd., which is steep-to, at a prudent distance, and anchor in Brixham road with Brixham high ch. and pier-hd. in line, S.W., and Berry Hd. from S. to S.S.E. Large ships, to secure an offing in the event of a S.E. gale, should not anchor farther S. than to have Paignton ch. on with Roundham Pt., N.W. ¾ N.; nor farther W. than to have the high part of the Thatcher over the narrow neck of Hopes Nose, N.E. ¼ N. In the event of parting, the best place to run on shore is on the beach in Elbury cove, in the S.W. angle of the bay.

Bound for Brixham at night, to avoid the foul ground off Shoalstone Pt., keep well N. of that Pt. until the red Lt. on the pier opens out; the Lt. then kept S.W., will lead in clear of the end of the breakwater.

Entering Torbay from the N., a vessel may pass mid-channel in 5 to 9 fms. between Orestone and Flat rock off Hopes Nose. Orestone its own length open of Thatcher, E. ½ S., clears all rocks and foul ground on N. side of the bay; and with this mark on, and the whole of Torquay pier open of Beacon hill, N.N.E. ½ E., is a good berth to anchor in Torquay road.

ANCHORAGES.—Babbacombe bay, 1½ m. N. of Torbay, affords good anchorage with W. winds in 4 to 5 fms., sand. Thence to Portland Bill the anchorage off all the small towns is sheltered only from N. winds.

TEIGNMOUTH is at entrance of the river Teign, 40 m. N.W. by W. ¾ W. from the Bill of Portland, and 4½ m. N. by E. ½ E. from Hopes Nose. The Ness, on the S. side of entrance, is a headland of red sandstone 174 ft. high; Ferry Pt., on the N. side, is a long low tongue of loose shingle changing with every gale. The Lt.-ho., inside this point, on the S.W. end of the Denn, is 37 ft. high, and shows a *fixed red* Lt.; a small shifting *red* Lt. is placed in a house behind it. The two Lts. in one lead up to the fairway.

The river falls into the sea through a narrow channel, obstructed by a bar, which nearly dries at L.W. sps., and as it is ever changing a pilot is indispensable to a stranger. There is 10 to 12 ft. at L.W. in the channel off the town; sps. rise 13 to 14½ ft., nps. 9½ ft., and nps. range 6 ft. The tide at sps. runs 1 to 1½ kts. from the swingbridge to the moorings off the town; 3 kts. below the moorings; 5 kts. at Ferry Pt., slacking after passing the Ness; and 1 to 2½ kts. over the bar.

The bottom off the entrance is free from rocks, and a vessel may anchor outside the bar according to her draught; but shoal-water extends a long distance outside the sand heads, there being only 12 ft. at ⅓ m. from the Ness. To ensure 18 ft. at L.W., keep Berry Hd. open of Hopes Nose, which also leads ½ m. outside the sand heads, and is a safe turning-mark between this and Torbay. This, however, is a dangerous position to be surprised in with bad weather, therefore at the first sign of it gain an offing.

EXMOUTH is at mouth of the river Exe, which falls into the sea at the bottom of Lyme bay, N.W. by W. ¼ W., 36½ m. from Portland Bill, and 12½ m.

N.E. ½ N. from Berry Hd. The entrance is at all times difficult of access, unapproachable in a heavy sea, and must on no account be depended on for refuge. From the entrance, which has a long shallow bar, up to Exmouth the channel is narrow and winding, and as 5 ft. at L.W. must in all probability be crossed, it ought not to be attempted without a pilot. Sps. rise 12¼ ft., nps. 8½ ft., and nps range 5 ft.

Exmouth is 1 m., and Exeter 8½ m., within the entrance. The principal communication to Exeter is by canal, which, commencing 1 m. below Topsham, is 5 m. long, 13 ft. deep, 30 ft. wide, and terminates in a lock and basin; the lock is 120 ft. long, 28 ft. wide; and the basin opposite the quay at Exeter, 917 ft. long, 18 ft. deep, and 90 to 110 ft. wide. Vessels must lighten to 12 ft. before they can enter the canal. A floating dock, 530 ft. long, 300 ft. broad, has lately been opened at Exmouth; and opening from it a dry dock, 250 ft. long, 58 ft. broad, is in course of construction. There is a dry dock (page 119) and a steam-tug, at Topsham.

At Topsham lock the tide begins to rise about 2 h. after L.W. at Exmouth, and it is H.W. a ¼ of an hour later than at Exmouth; sps. rise 1 ft. less, the nps. are the same. When the banks at the entrance are covered, both flood and ebb streams set fairly over them, about 2½ kts.; but when uncovered these streams run strong through the channel, and their strength increases at Ferry Pt. to 5 kts.*

DIRECTIONS.—Approaching Exmouth from the S.,—Exmouth ch. N.N.W. ½ W., or on with the S.E. house on Beacon hill, leads up to the fairway conical buoy, *striped black* and *white horizontally*, with *staff* and *globe*, moored in 5 fms. 1 m. outside the entrance, from which buoy the above bearing is on, and Mamhead tower (standing on high land S. of obelisk on Haldon hill) is just open N. of Langstone Pt., W. by N. ½ N., and Orcomb Pt. bears N. by W. ½ W., distant 6½ cables. If waiting tide to enter, and the weather will permit, anchorage can be taken anywhere near this buoy, keeping E. or W. of it according to the wind.

The N. side of entrance is fronted by rocks, and marked by 5 *black* buoys; the S. side is bounded by sands and marked by 4 buoys, *striped black* and *white vertically*. If compelled to run in without a pilot, leave the black buoys on starboard hand, and those *striped black* and *white vertically* on the port. The atmospheric railway chimney (a tall conspicuous red tower) at Star Cross, in line with Exmouth Pt., N.N.W. ¾ W., leads *west* of the first *black* and *white vertical striped* buoy, and up to the anchorage in 4 fms. off the town.

Entering from the W.,—Exmouth ch. well open E. of a long sandy Pt. (called the Warren) on W. side of entrance, N.E. by E., leads outside the Dawlish rock of 11 ft. water, lying ½ m. off Dawlish. Straight Pt. kept E. by N., leads up to the Fairway buoy. A good turning-mark up to this buoy is to keep the whole of Exmouth open of Warren Pt., and not to open Mamhead tower N. of Langstone Pt.

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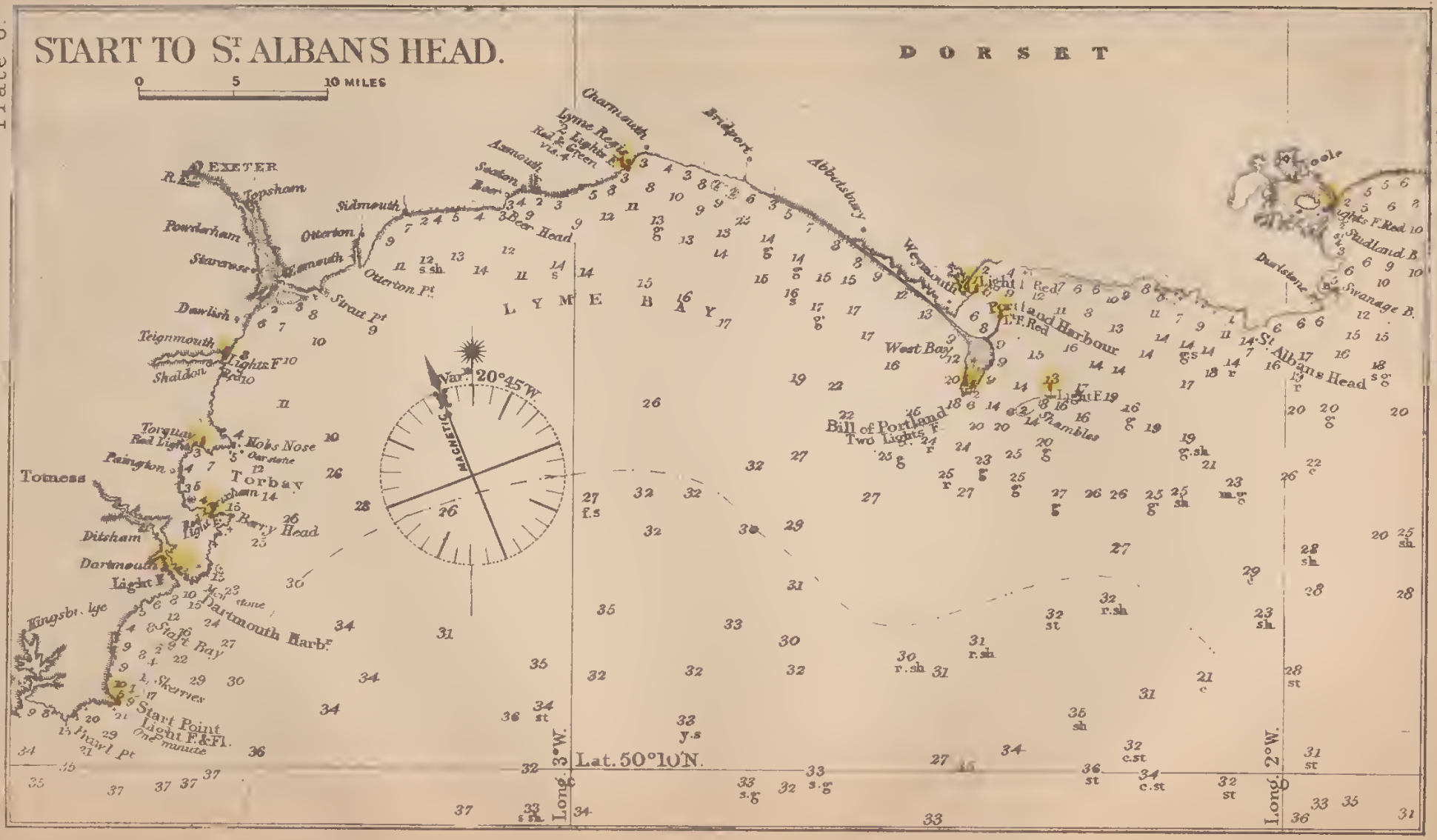
* Additions to 1874 by Mr. S. Bowdery, Harbour Master.

Plate 6.

START TO St. ALBANS HEAD.



Malby & Sons, Lith.

Entering from the E.,—give Straight Pt. a berth of ¼ m. in passing; then Mamhead tower in line with the houses at Mount Pleasant, W. by N. ½ N., will lead inside the Fairway buoy, and up to leading mark for entering.

ANCHORAGES off the COAST.—At 15 m. E. of Exmouth is Culverhole Pt., and between are three watering-places, Budleigh Salterton, Sidmouth, and Seaton, abreast which colliers anchor in fine weather, and land their cargoes on the beach. Approaching Budleigh Salterton, avoid the Foot Clout rock, with only 2 ft. on it, lying ½ m. S.E. by S. of the chapel; and also the Otterton ledge, running off ¼ m. S.W. ¼ W. from Otterton Pt.

Sidmouth is in a valley, bounded E. by Salcombe hill, 535 ft. high, and bounded W. by High peak, 500 ft. high. Beer Hd. is a precipitous chalk cliff, 426 ft. high, the westernmost chalk cliff in England; on its E. side is a confined anchorage sheltered from N. winds. Anchor with Beer Hd. W. ¾ S., and Beer village N. by W. ¾ W., in 5 fms., sand. Seaton village is a short distance W. of a small pier and landing quay at the entrance of the Axe, an insignificant stream which percolates through the beach.

Clearing Marks:—Obelisk in Bickton park in line with coastguard watch-ho. on shore, N.N.E. ¼ E., leads W. of the Foot Clout; and Sidmouth ch. open ¼ point of land E. of Otterton Pt., leads in 3 fms. outside Otterton ledge; but *all* rocky ledges between Exmouth and Beer Hd. will be avoided by keeping ½ m. off shore.

LYME REGIS (22 m. N.N.W. ¾ W. from Portland Bill) has a small pier harbour which dries out at L.W., but the tide rises 9 to 12 ft. in it at H.W. sps. The Cobb (a substantial stone pier) runs off S.E. from abreast the Custom-ho., and the entrance of the harbour is on its E. side, between two inner piers, the northern one of which is called the N. wall. The Cobb protects small vessels within it from S.W. gales; while the Inner pier and N. wall shelter the harbour from the swell caused by S.E. gales. A heavy sea outside causes a run within the piers; but the bottom is mud and sand. A short breakwater of loose stones runs off from the Cobb end, and its outer extreme is marked by a *beacon*. Sps. rise 12 ft., nps. 9 ft., and neaps range 6 ft.

Two *fixed red* Lts. are shown all night in the harbour, one (11 ft. high) from Inner pier-hd., the other (21 ft. high) from Custom-ho. They are 275 yards apart in a N.W. ½ N. direction. The Custom-ho. Lt. just open E. of pier Lt., N.W. ½ N., clears outer Cobb end, and leads to Inner pier-hd. By day give the beacon off the Cobb end a berth of 20 or 30 yds. in passing, and then steer for the Inner pier-hd. This harbour is not commonly used for refuge, but if a vessel is embayed, she can safely run for it, and save life if not property. The best time to run in is at ¾ flood. There is a warp, a capstan, and a lifeboat always in readiness.*

HIGH GROUND and POLLOCK are two rocky shoals, ¾ m. apart, with 6 fms. water between, lying W. of Bridport. High ground, ½ m. long, 1¼

* Additions to 1874 by Mr. R. Holder, Harbour Master.

cables broad, and with only 9 ft. water near its S.E. end, lies 1¼ m. W. by N. ½ N. from Bridport pier, and ½ m. off shore. Pollock, only 1¼ cables in diameter, nearly circular, and with 11 ft. over its shoalest part, lies ¾ m. W. by S. from the pier.

Clearing Marks:—Puncknoll knoll (a conical hill, 587 ft. high, with small ho. on summit), in line with low end of the E. and last cliff eastward of Burton coast-guard, S.E. by E. ¼ E., leads S. of both High Ground and Pollock. Down hall (a large white ho., in trees, on N. side of Bridport), on with Bridport pier-hd., N.E. by N., leads E. of Pollock. The W. end of North hill (376 ft. high, the first hill inland of Bridport E. cliff, on with the pier-hd., E. ¾ S., leads between the shoals. Thorncomb peak (509 ft. high) N.E., leads W. of High Ground.

BRIDPORT (16½ m. N.N.W. of Portland Bill) has a small secure pier harbour, with 14 ft. between pier-hds. at H.W. sps., but the entrance dries at L.W. The piers, 52 ft. apart, form a straight canal-like entrance in a N.E. direction, but about 2 ships' lengths within is a projecting wooden jetty, which narrows the entrance to 35½ ft.; it then expands into a secure basin, 547 by 135 ft., capable of containing about 30 vessels of the tonnage that usually resort to the port. Sps. rise 12 ft., nps. 8 ft., and nps. range 4 ft.*

Vessels in entering shoot between the piers, and are then tracked in. The best anchorage outside is abreast the piers, about ¼ m. off shore, in 3 or 4 fms., fine sand; farther off the ground is foul. During S.W. gales the sea breaks heavily at the entrance, and the harbour is unapproachable. Small vessels must then seek for shelter in Lyme Regis.

WEST BAY, on the N.W. side of Portland, shelters from E. winds (between S.S.E. and N. by E.), but it is a dangerous position to be caught in, should the wind suddenly fly round to the W., for a heavy sea soon gets up.† Small vessels anchor abreast the S. end of Chesilton village, ⅓ m. off shore, in 9 fms., clay bottom, with Portland high Lt.-ho. touching Blacknor Pt., S.S.W. ¼ W. Large vessels anchor at 1¼ m. off shore, in 17 fms., the Bill bearing S., and the abrupt shoulder of the Vern E. ½ S. For the set of the stream, see Portland Race, page 40.

BILL OF PORTLAND TO BEMBRIDGE POINT.

VARIATION, 20° 30′ TO 19° 45′ W.

MAKING THE LAND.—The peninsula of Portland, 3½ m. long, N.E. and S.W., and 1½ m. wide at its broadest part, is connected to the coast by a narrow isthmus about 43 ft. above L.W., and when viewed from E. or W. presents a remarkable wedge-like appearance, invaluable to seamen as a point

* Additions to 1874 by Mr. M. J. Briggs, Harbour Master.

† The bottom is blue clay, and the holding ground excellent within 3 m. of the shore.—Staff Commander John J. Ball, R.N., Harbour Master at Portland, 1866.

of recognition in sailing up or down Channel. Its highest part (the Vern, near its N. end) is 488 ft. high, and from thence the land slopes gradually to the S.W., terminating in the Bill, 40 ft. high.

Between Weymouth and Ringsted Pt. the coast is composed of a brown sandstone; from Ringsted Pt. to Lulworth cove it is chalk cliff, and then again brown sandstone to St. Alban's Hd.; from thence to Peverel Pt. it is dark rock, and then chalky as far as Old Harry. St. Alban's Hd. is a bold headland 359 ft. high, with an ancient chapel on its summit. From hence the coast is bold and composed of dark-looking limestone cliffs to Durlston Hd., when it bends abruptly to the N., forming the W. shore of the deep bight between St. Albans Hd. and St. Catherine Pt. From Poole Hd. (in this bight) the shore curves to the E., and on to Hurst Pt. are a succession of earthy cliffs, intersected by ravines. Christchurch Hd., 6 m. E. of Poole Hd., is a dark reddish-looking ironstone cliff, 120 ft. high.

Throughout Christchurch bay the land is lower, and still more so towards Hurst. The Needles, white chalk cliffs, at the W. extreme of the Isle of Wight, rise perpendicularly from the sea, and are remarkable from the offing when contrasted with the dark-coloured ground behind them; these, with the white Lt.-ho. on the outer Needles rock, Hurst castle, the batteries and Lt.-towers on Hurst Pt., and the red brick forts on Sconce and Cliffs End Pts., are good guides for entering the Needles channel.

From the Needles, where the summit of the land is 400 ft. high, the land gradually rises to the E.—St. Catherine hill, the highest part of Isle of Wight, being 804 ft. high, and St. Boniface down, above Dunnose, 770 ft.; from thence it declines towards Culver cliff, which, being chalk, contrasts strongly with the red clay cliff close to the W. of it. From Culver cliff the land gradually lowers, until it terminates in Bembridge Pt. (See also page 45.)

LANDMARKS.—St. Georges ch. is near the centre of Portland, and with the two windmills near it, and the two white Lt.-houses, which stand ½ m. within the Bill, and exhibit *fixed* white Lts., are useful seamarks. On the extreme Pt. of the Bill is a stone *beacon* 20 ft. high, the summit 60 ft. above H.W. At ¾ m. W. of Weymouth is Wyke Regis ch., a conspicuous and good mark for clearing the Shambles. At 1½ m. inland of Redcliff Pt., at head of Weymouth roadstead, is a large figure of a man on horseback cut out of chalk on Osmington down, showing white* on the green slope of the hill, and visible many miles seaward.

The most conspicuous objects at the back of Isle of Wight are:—Nodes beacon, a largo wooden structure coloured black, near the edge of the cliff, at 1½ m. E. of Needles; the stone Lt.-ho. on St. Catherine Pt.; the ruins of the old Lt.-ho., and an old tower on St. Catherine hill; Steep hill castle, and villas and ch. at Ventnor; Yarborough tower on Bembridge down, over Culver cliff; and Foreland farm, near Bembridge Pt.

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* This mark has not been cleaned lately, and is getting indistinct. Staff Captain W. F. Hains, R.N., Harbour Master, Portland, 1873.

PORTLAND LEDGE.—Portland is safe to approach on both sides, but the soundings are irregular, particularly near the pitch of the Bill, off which a ledge extends S.S.W. 1 m., terminating in a sharp point. The soundings on the ledge vary from 3 to 9 fms., breaking down suddenly into 20 on W. side, 18 on S. side, and 13 and 14 fms. on E. side. There is 5 fms. at 2 cables from the Bill, 10 fms. at $\frac{3}{4}$ m., and 20 fms. at $1\frac{1}{4}$ m. The beacon on the extreme point of the Bill is placed there to guide small vessels against a low shelf of rock, extending 150 ft. from the point.

PORTLAND RACE.—From 2 h. to 11 h., F. & C., there is an outset from West bay on the N.W. side of Portland of nearly 9 hrs. duration, which closely skirts the rocky shore, and gradually increases in strength as it approaches the Bill, where it acquires such velocity as to extend far beyond that point before it turns to the E., leaving a strong eddy between it and the land. Having assumed its E. course, it rushes 6 or 7 kts. during spring-tides past the pitch of the Bill, leaping and foaming over Portland ledge with great violence. A short distance E. of the ledge this outset is met at right angles by a counter eddy, which sets for 9 hrs. out of Portland bay, running strong past Grove and Godnor Pts. forming overfalls at times; these united streams press on towards the Shambles, which they cross obliquely about E., running $3\frac{3}{4}$ kts.

During spring-tides the agitation is so violent in the Race as to render it dangerous for small vessels; and in tempestuous weather, during the E. stream, the whole space between Portland and the Shambles is one sheet of broken water. In N. winds the Race extends nearly 2 m. from the Bill, and there are great overfalls beyond that distance; but with S. winds it scarcely exceeds $\frac{1}{2}$ m. During the E. stream the overfalls take place eastward of the ledge, and during the W. stream westward.

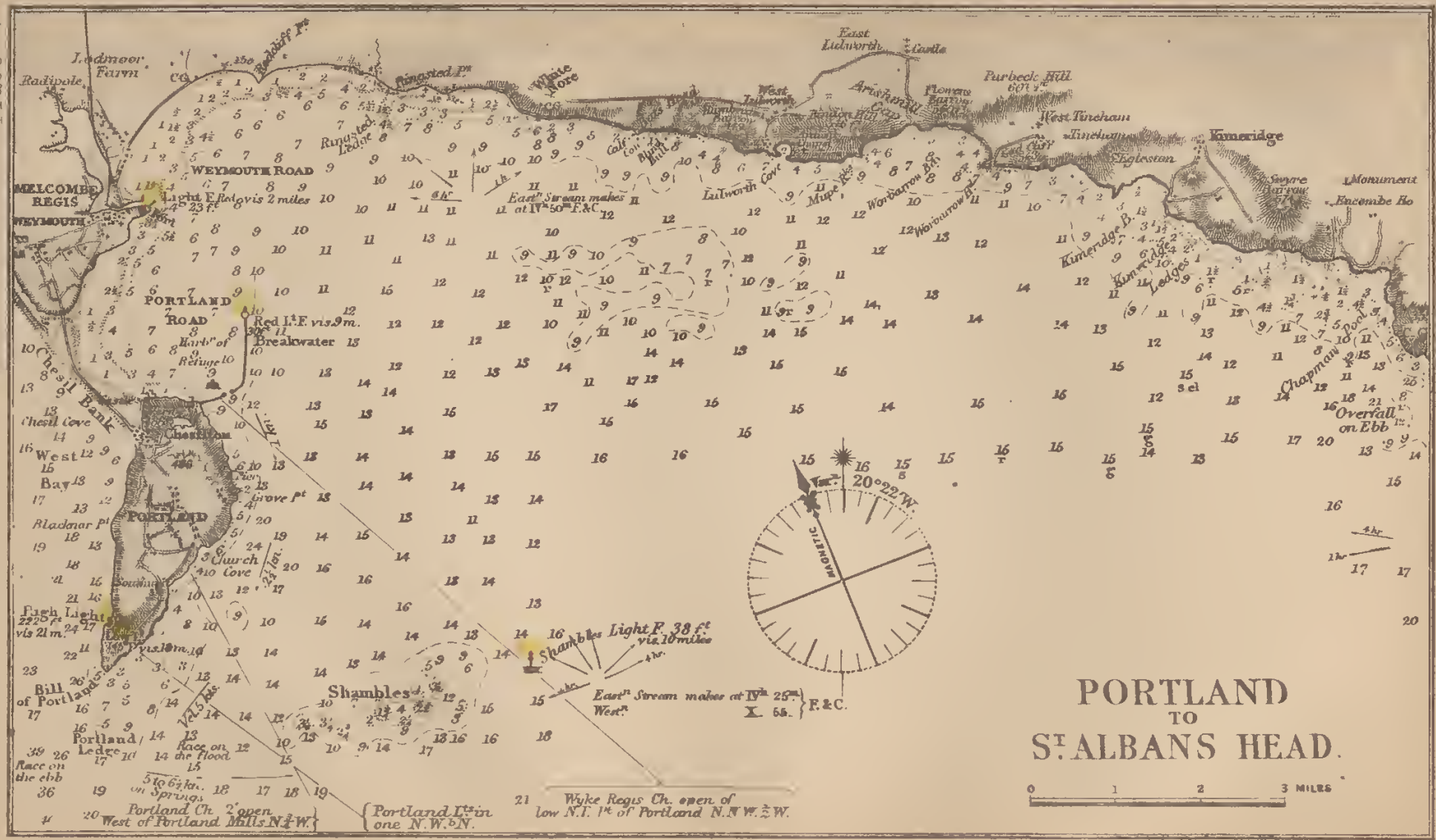
DIRECTIONS.—A sailing vessel should never attempt the channel between the Bill and Shambles without a commanding breeze. The small chalkpit (a short distance W. of the man on horseback cut out of chalk on Osmington down), seen over Grove Pt. (the E. extreme of Portland), N.N.E., or the Breakwater Lt.-ho. just open of Grove Pt., N.N.E., leads between the W. end of Shambles and Race; but remember that the E. stream sets direct from Bill towards Shambles, and the W. stream as strongly into Race.

At night keep Portland Lts. in line, N.W. by N.* (if the E. stream is running keep the high Lt. open W. of low Lt.), until the *fixed red* Lt. on Breakwater bears N. by E. $\frac{3}{4}$ E., when steer for it on that bearing—or keep it open and shut of Grove Pt., about N.N.E.,—taking care to preserve a safe offing on approaching Grove Pt., and a prudent distance when passing and rounding the Breakwater.

Vessels bound to the W. with a W. wind may, while the E. stream is running, turn to windward along the E. side of Portland nearly up to the Bill by keeping in shore; but if they attempt to round the Bill before the tide

* The True Bearing of Portland Lights in line is N. 53° W.

Plate 7.



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slacks, they will in all probability be swept off shore and carried through the Race. Coasters can approach the E. side of Portland to 1 cable in not less than 3 fms. water; vessels of large draught should not approach nearer than ¼ m.

Between the Race and Bill there is a channel of 3 to 9 fms. water, frequently used by small vessels, particularly with leading winds. To run through from West bay, weigh with the last of the ebb, and steer for the high Lt.-ho., keeping the Bill rather open on *starboard* bow, with which precaution, as the vessel nears the shore, the tide will sweep her round the Pt. and within the Race; but to shape a course for the Bill, in order to give it a berth, she would be caught in the strong tide. With a beating wind, work close up along the land, as it is bold to 1 cable.

In using this passage, remember that the strong eddy tide, or 9 hours' set, just mentioned, on the E. side of Portland, runs in a different direction to the one out of West bay. If, therefore, the vessel is so late on the tide as not to be able to get round the E. Pt. of Portland before the fourth hour of flood, she had better anchor, to prevent being carried back again into the West bay tide, or endeavour to get off shore to the E. into the fair flood stream.

SHAMBLES BANK, of coarse sand and gravel, should on no account be crossed by vessels of more than 9 or 10 ft. draught, and then only in fine weather. Blowing hard, the sea breaks furiously over the bank, and instances are known of small vessels foundering on it. Its W. end (assuming the depth of 10 fms. for limits) bears from Bill of Portland S.E. ½ E. 2¼ m.; from thence its direction is E. ½ S. 2½ m., with an average width of ⅔ m. It has several shoal hds. of 11 to 18 ft. water, with 5 to 7 fms. between. The least water, 11 ft., is near the middle of the bank, from which St. Georges ch. is on with the S. side of Church cove, N.N.W. ½ W. The *Lt.-vessel*, moored in 15 fms. off the E. end of the bank, has one mast, and shows a *fixed white* Lt.

The bank clearly shows itself, except at slack water, by a ripple on N. or on S. side, according as it may be flood or ebb. On S. side the bank rises suddenly from the depth of 10 fms. The approach on N. side is more gradual, but a vessel of large draught should not shoal towards it to less than 10 fms.

Clearing Marks:—Wyke Regis ch. on with the low N.E. Pt. of Portland, N.N.W., leads over E. end of Shambles in 7 fms.; St. Georges ch. open ¼ point W. of Portland mills, N. ¾ W., leads over W. end in 8 fms.; and St. Georges ch. on with the mills, N. by W. ½ W., leads over W. end in 26 ft. To pass ¼ m. E. of 10 fms. water at E. end of the shoal, keep Wyke Regis ch. just open E. of extreme low N.E. Pt. of Portland, N.N.W. ½ W. This mark will lead close to the westward of Lt.-vessel.

Anvil Pt. seen just clear of St. Alban's Hd., E. ½ S., leads ¼ m. N. of 10 fms. water on N. edge of Shambles; and the same Pt. open 3° of the Hd., bearing E. ¼ N., leads ¾ m. S. of 10 fms. on S. edge. Portland Lts. afford no guide at night for sailing outside this shoal, therefore do not approach it within the depth of 20 fms. in fine, or 30 fms. in thick, weather. The tide

at F. & C. sets 3 to 4 kts., E. by N. and W., over the shoal, making to the E. at 3 h. 57 m., and to the W. at 10 h. 17 m.

PORTLAND HARBOUR is easy of access, and offers refuge from all winds to vessels of every class, in 3 to 9 fms., soft mud bottom, good holding ground. Men-of-war anchor E. of the line of the two triangular marks, whitewashed, on the hill side at Castletown in one, S.S.W.; merchant vessels anchor W. of that line. If obliged to moor, have open hawse to the N., with small bower to the W., a good scope of cable out, and (in winter) sheet anchors ready.*

Bound to this harbour from the S.E.,—if the W. stream is running, keep Wyke Regis ch. open (if the wind is light keep it *well* open) of the N.E. Pt. of Portland, or at night pass well E. of Shambles Lt.,—if the E. stream is running, Shambles Lt. and *red* Lt. on N. extreme of Breakwater in one, N. by W. ¼ W., is a good mark. After passing the Shambles, the Breakwater Lt. kept N. by W. ¼ W. will lead up to it, but give the Lt. a berth of a cable in rounding. Standing towards Nothe Pt., do not open Blacknor Pt. W. of Portland castle, S.W. by S. Standing towards Sandsfoot castle, keep Preston coastguard (white) open of Nothe Pt., N.E. ½ N.

"With Portland high Lt. just visible clear of Blacknor Pt., tho vessel will be in 4 to 5 fms. water *if southward* of Sandsfoot castle: this was the night anchoring mark before the breakwater was built, and is a good working mark for light draught vessels."†

WEYMOUTH ROAD and HARBOUR.—The road is free from foul ground, and only open between S. and E. Anchor about 1 m. off the harbour in 5 to 8 fms., sand and gravel. The ground is foul within ¾ m. of N. shore.

The harbour has 8 to 9 ft. in it at L.W. sps.; sps. rise 6¾ ft., nps. 4½ ft. Yachts and small craft lie up during winter in the Backwater above the swing-bridge. There is a patent slip, 150 ft. long, 6 ft. on fore-block, 14 ft. on after-block at H.W. sps., which will receive a vessel of 300 tons. From 14½ to 16½ ft. can be carried up the harbour at H.W. sps., and 12 to 14 ft. from the bridge to the Backwater, where there is a small gridiron on which steamers drawing 5 ft. can have their bottoms cleaned.

The N. side of entrance of harbour is protected by a stone and pile pier, running E. by S. from the S. end of Melcombe Regis; and the S. side by a stone pier running E.N.E. 280 ft. from Nothe Pt., and is continued 370 ft. farther by a breakwater of loose stones, which *cover* at H.W.; the outer end of these stones is marked by two *black* buoys, the one on the eastern part is a *beacon* buoy, and that on the western part a *nun* buoy.‡

* Staff Commander J. J. Ball, R.N., Harbour Master at Portland, in 1866, remarks: —"I am satisfied there would not be one half the vessels go ashore here in heavy gales if they had chain enough to veer to 150 fms. Coasters have usually only 60 fms. on each anchor; the result is that they are often found on the beach, with the loss of all hands. Ships wintering in the harbour should have the sheet anchors a cock bill, and at the cat-heads, instead of letting go from the waist."

† Staff Captain W. F. Hains, R.N., Harbour Master, 1873.

‡ Mr. F. W. Mace, Harbour Master, 1874.

To avoid L.W. rocks bordering the shore between Sandsfoot castle and Nothe Pt., keep the coast-guard (white) at Preston open of Nothe Pt., N.E. ½ N. To clear Mixen rocks, which run off nearly a cable E. of Nothe Pt., do not bring St. Johns ch. (it stands at N. end of Melcombe Regis) north of N. ¾ W. Give the buoys a berth of 200 ft. in rounding, then keep in mid-channel.

At Night.—The two *red* Lts. at the N. part of the town in line, N.N.W., lead to the entrance of harbour, clear of Mixen; taking care not to open the high Lt., to the left or west of low Lt. When the two *green* Lts. on the N. pier come in line W. ¾ S., a vessel will be at the proper position for entering, leaving the buoys on the port side. Then keep the two *green* Lts. in line until within 50 or 60 yds. of the E. or low Lt., when the depth will be 8½ or 9 ft. at L.W. sps.; then the deepest water will be in mid-channel, between N. pier and S. quay.

RINGSTED LEDGES.—Rocky ledges border the N. shore of Weymouth bay. Those off Ringsted Pt. extend ⅓ m. off shore, and have only 10 ft. on their outer end.

Clearing Marks:—Lodmoor farm just open of base of cliff at Preston coast-guard, N.W. ¾ W., leads S. of all foul ground from Redcliff Pt. to Whitenore Pt. Thence to Worbarrow Hd., to clear the outlying rocks, keep Swyre Barrow Hill (674 ft. high) open of Broad Bench Pt., S.E. by E. ½ E.

LULWORTH COVE, a circular little basin begirt by high cliffs, has 12 ft. in it at L.W. sps., and in cases of necessity would afford shelter to small vessels; sps rise 7 ft., nps. 4½ ft. The clear entrance, 250 fit. wide, is between rocky ledges running off each Pt. In entering keep ⅓ over from the E. cliff, as the longest ledge is on W. side.

WORBARROW BAY, 1 m. E. of Lulworth, shelters from W. by N. (round N.) to S.E. by E. The best berth is between Arish Mill gap and Worbarrow Hd., ⅓ m. off shore, in 5 to 7 fms., fine sand.

Arish Mill gap (known by its white sandy beach), open of Warbarrow Hd. (it has a small conical hill on summit), N.W. ¾ N., leads outside ledges extending ½ m. off shore between Worbarrow Hd. and St. Albans Hd.

St. ALBANS HEAD has generally a race off it, particularly in blowing weather, caused by the uneven ground. The overfalls extend 1 m. off shore; they have not less than 5½ fms. in their vicinity, with 12 and 15 fms. on E., W., and S. sides.

SWANAGE BAY, being exposed to the E., is not much used except by small vessels in fine weather. They anchor on its S. side, ¾ m. off shore, in 4 to 6 fms., fine sand. Purbeck stone is shipped here from a pier, 273 yds. long, 18 ft. wide. The pier has two cranes that will lift 5 tons, and there is 12 ft. at pier end at L.W. Sps. rise 6¼ ft., nps. 4¼ ft.

To avoid the rocks between Durlston Hd. and Peverel Pt., do not bring the Hd. to the S. of S.W. by W. ½ W., nor approach the Pt. within ⅓ m., until Swanage ch. comes *well* open of N. shore of Peverel Pt.. W.N.W. Old Harry and Old Harry's Wife are two remarkable pinnacle rocks off Standfast Pt.

Old Harry in line with Pool Hd. coast-guard, N. by E. ¾ E., leads ¾ m. outside the *black buoy* on the outer extreme of the ledge extending off Peverel Pt., and over which is a strong tide race.

STUDLAND BAY shelters from W. winds. Small vessels anchor in 2 fms. off three remarkable projections in the chalk cliff (called the Yards), with the Agglestone (a large square rock on a small hill ½ m. inland) open N. of coast-guard on Red-end Pt., W. by N. ¾ N., and Old Harry S.E. by S. Large vessels anchor farther out according to their draught, with Studland ch. W. Give Ballard and Standfast Pts. a berth of ¼ m. in rounding.

POOLE HARBOUR has general depths of 2 to 7 fms., but as the entrance is fronted by shifting sands, a stranger must take a pilot. Vessels can lie afloat off Poole, or aground alongside the quays. The channel up to Wareham has patches of 1 to 2 ft. at L.W., but is navigated by vessels of 20 or 30 tons. At Poole, sps. rise 6½ ft., nps. 4¾ ft. At Wareham the rise is 4 ft. and 2½ ft.; the rise, however, depends greatly on the winds.

DIRECTIONS.—Banks of sand having grown up in the Old Bar Channel (which was formerly the principal passage leading to the entrance of Poole harbour), it is no longer used, and the buoys have been removed. The deepest water is now through the Swatch, which has lately been increased in width and depth. This channel has 6½ ft. in its shallowest part at L.W. sps., and its starboard side is marked by *black* (can) buoys, and its port side by cask buoys, *striped red* and *white vertically*, the third buoy on the port side being distinguished by *staff* and *ball*. The chart gives the leading marks for the Swatch when it was last surveyed; as, however, from the nature of the sands, the direction of the deepest water may alter, it will be prudent when entering to be guided by the buoys, leaving the *black* (can) buoys to starboard, and the *red* (cask) buoys *striped white* to port.

From Brownsea, leave the buoys striped *red* and *white vertically* to port, and *perches* on mud bank to starboard; also the ball *beacon* on S. end of Middle Ground, and *red* buoy at N. end to port. From thence the limits of the channel on either side are marked by *perches* to Poole creek, which has a *black* buoy on starboard side of entrance, and a *red* buoy *striped white* on port side.

At Night, if compelled to take the harbour, the Lts. in line N. ⅓ W., will lead through the Swatch, and up the channel, until the vessel is about ¼ m. from the low Lt., when keep in mid-channel, and anchor abreast Brownsea castle in 5 fms.

POOLE ROCKS.—In the N. part of Poole bay are shoal patches of 8, 16, and 18 ft., with 6 and 7 fms. between. The inner patch, 8 ft., lies ½ m. off Poole Hd.; the outer patch, 16 ft., is nearly 1½ m. from Bournemouth shore.

Clearing Marks:—Arne trees (a remarkable clump, 178 ft. high, near head of Poole harbour) well open S. of Brownsea island, N.W. by W., leads S. of all these patches; and the whole of Swanage well open of Ballard Pt., S.W. by W. ½ W., leads E.

BOURNEMOUTH PIER is 267 yds. long, 16 ft. wide. Its ⊤ head is 36 yds. long, 30 ft. wide, and has 14 ft. alongside it at H.W. sps.

The ground inshore, W. of pier, is foul, and ½ m. from the pier are the Bournemouth rocks of 14 ft. water; and within them the Darby rocks of 8 ft. Brownsea castle open of base of Poole Hd., W. ½ N., leads S. of these rocks and foul ground; Durlston Pd. open of Old Harry, S.W. ¼ W., leads E.

CHRISTCHURCH LEDGE.—Between Bournemouth and Christchurch Hd. the ground is clean, and the shore may be approached to ⅓ m. A narrow ledge runs 2¾ m. S.S.E. ¾ E. from Christchurch Hd., and near its middle, 1¼ m. from the Hd., is a *black* buoy in 3 fms.; but remember that there is only 2¾ fms. on outer part of this ledge at twice that distance from shore. Small vessels, by crossing the ledge close to the buoy, will carry 2½ fms. at L.W.

Clearing Marks:—Priory ch. tower at Christchurch, just open E. of watch-ho. on Christchurch Hd., N. by W. ½ W., leads along W. side of outer part of ledge, and this mark may be used until the vessel has approached the shore to ½ m., but no farther. Nodes beacon, on Isle of Wight, on with junction of red and white cliffs in Alum bay, E. by S. ½ S., leads 1¼ m. S. of ledge, also along the S. side of Dolphin bank up to S.W. buoy of Shingles.

A clump of trees on distant hill open W. of High cliff trees, N. by E. ¼ E., or High cliff ho. N.N.E. ¼ E., crosses Christchurch ledge in 2½ fms. High cliff ho. N. ¼ E. leads over tail of Dolphin bank in 4½ fms., also E. of ledge in 6 fms., and up to anchorage off Christchurch in about 3 fms., sand and mud, with Priory ch. in line with Haven ho., N.W., and Durlston Hd. open of Christchurch Hd.

CHRISTCHURCH HARBOUR is only accessible at H. W. to vessels of 5 or 6 ft. draught, as the bar of drift sand at entrance dries at the lowest tides, and, as it often changes its position, a stranger should not attempt to cross it without a pilot. Sps. rise 6 ft. on bar, 5 ft. at entrance, 3 ft. at town.

SOUTH COAST OF ISLE OF WIGHT.

The aspect of this coast has been given in page 39. Between the Needles and St. Catherine Pt. the coast must be approached with *caution*, particularly in thick weather and during the flood, as that stream sets directly towards Brook and Atherfield ledges, which extend nearly 1 m. off shore. Chale Bay, 2 m. N. of St. Catherine Pt., has been the scene of many fatal wrecks.

Give the shore of St. Catherine Pt. a berth of ½ m. in rounding, as shoal-water extends more than half that distance from it; also keep ½ m. off between this Pt. and Dunnose. The lead will be a good guide when standing into Sandown bay.

Culver spit is a rocky ledge of 4½ fms., extending 1½ m. S.E. from Culver cliff. A small reef, the outer part of which dries, projects nearly ⅛ m. from the base of the cliff. Close to the E. of the cliff is a small space (White Cliff bay) of clear ground, affording shelter with off-shore winds for small craft

waiting tide. The E. pitch of the cliff bearing W. ¾ N., and the coast-guard watch-ho N. by E., will place a vessel ½ m. off shore in 2½ fms.

No open boats should attempt to pass through the overfalls off St. Catherine Pt. and Dunnose in bad weather. In W. gales, during sps., the sea breaks to the S.E. of St. Catherine Pt. as violently as in Portland Race.

DIRECTIONS. (see also p. 3.)—The highest part of chalk cliff on E. side of Freshwater bay on with Brook Pt., N.N.W., leads ⅓ m. outside Atherfield ledges and rocks S.E. of them. A safe mark for small vessels working up inshore between the Needles and St. Catherine Pt. is to keep the *three* Needles rocks open of Sun Corner, or Priory ch. at Christchurch open of Needles Lt.-ho., N.W. ¾ N.: with the Lt.-ho. only open of Sun Corner a vessel would run upon the Atherfield ledges.

AT NIGHT do not stand into less water than 15 or 16 fms., keeping the Needles *red* Lt. in sight, or in a large ship not bringing it west of N.W. by N. (see p. 99). After losing sight of Needles Lt. do not shoal to less than 16 or 17 fms. until St. Catherine Lt. bears N.E., when, if bound to Spithead, haul to the E. to sight Nab Lts. (see p. 59.)

FOG HORN.—A powerful Fog Horn is sounded in foggy weather from St. Catherine Lt.-ho. The mouth of the Horn (81 ft. above H.W.) traverses an arc of 215°—viz., from E. ¾ S. (round south) to N.W., and *vice versâ*, and points in every direction between those bearings from the Lt.-ho. *once in each minute.* The Horn gives *three blasts* per minute;* the duration of the sound is 5 *seconds*, and the interval 15 *seconds* between each blast.

THROUGH NEEDLES TO SPITHEAD.

NEEDLES CHANNEL, between Bridge reef and S.W. prong of Shingles, is ⅓ m. wide, has 5 fms. at L.W., gravel bottom, and with care and a fair wind is safe for sailing-vessels of large draught; steam-vessels can navigate it at any time when the leading marks or Lts. are visible. For Directions see p. 53.

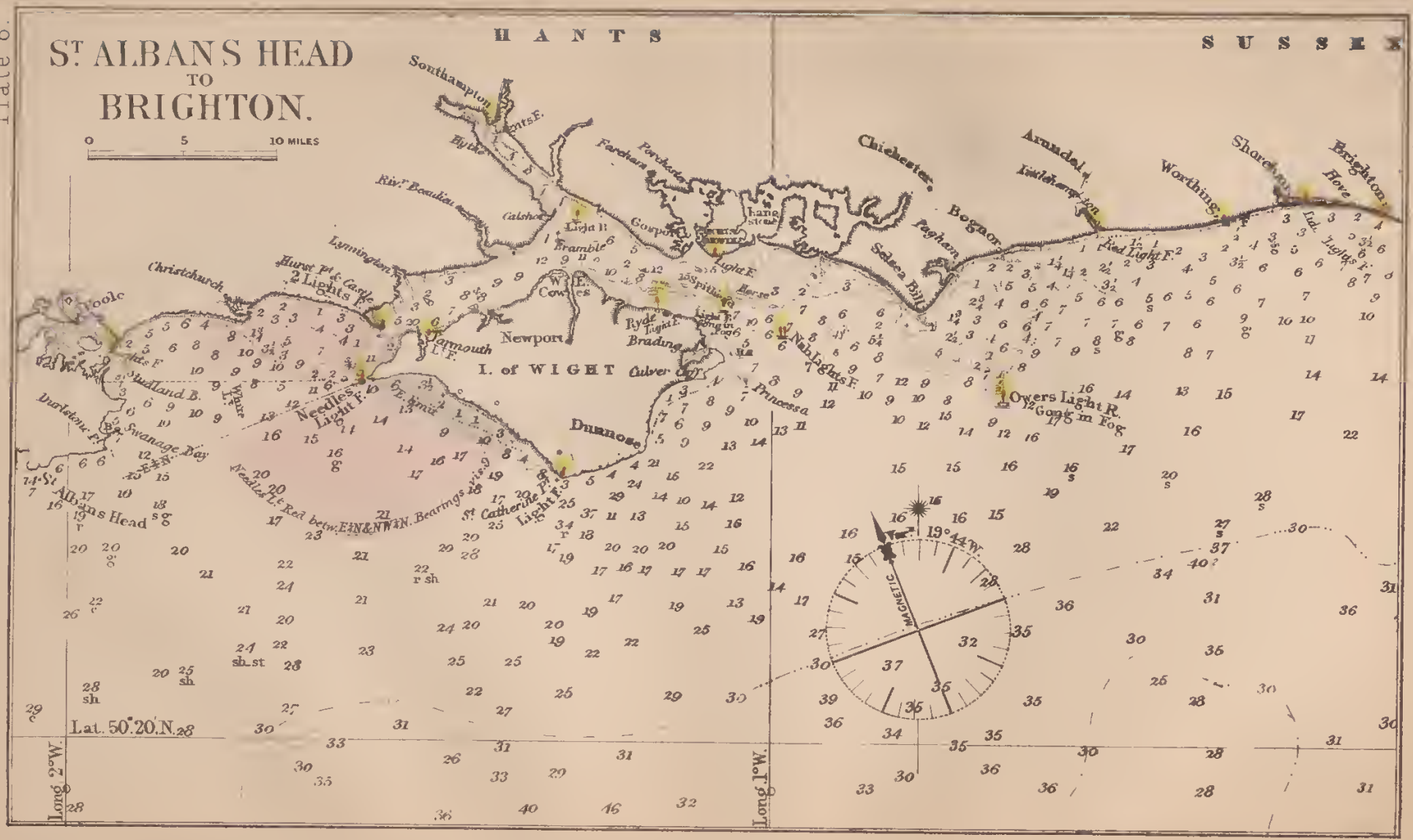
BRIDGE REEF runs off nearly 1 m. from the Needles Lt.-ho., on the line of the Needles rocks in one. It is narrow towards the W. end, steep-to on both sides, and with a ground swell on the sea breaks heavily some distance from the Lt.-ho.

Leading Marks:—The S. edge of trees at Hill farm seen *just* within or S. of Warden Pt., E. ¾ N., leads mid-channel between W. end of Bridge reef and S.W. buoy of Shingles. The N. end of same trees kept *just* within Warden Pt. leads over or near a 19-ft. rock, at L.W. sps., lying but little E. of the line

* The Fog Horn at the Owers gives *six blasts per minute* (see p. 102).

Plate 8.

St ALBANS HEAD TO BRIGHTON.



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of Hurst Lts. in one, N.E. by E. ¼ E.—* to the E. of this rock the reef becomes more dangerous. The above trees open N. of Hatherwood Pt., E. by N. ½ N., leads W. of all shoal hds. under 12 ft. on the reef, but close to a 6-ft. rock lying N.W. by N. ½ cable from the Lt.-ho. Small vessels hugging the Lt.-ho. to cheat the tide, should give it a berth of at least 150 yards.

Pepper rock open of Sun Corner, E. ¾ S., leads 2 cables S. of the Bridge, also S. of St. Anthony rock (which dries at L.W.) and a rock awash, both lying S.E. of Needle rocks, in Scratchell bay, and dangerous to small craft making too free with the shore.

The SHINGLES are banks of sand and shingle, uncovered or covered at L.W. according to the state of the weather. From their N.E. extreme, which is ½ m. from Hurst beach, they extend W.S.W. nearly 3 m., and terminate in two prongs; the S.W. prong has only 5 ft. on it. Overfalls will be seen on their S.E. edge on the flood, and ripples on their N.W. edge during the ebb. The N.W. side, except near the W. end, is of gradual slope, but the S.E. or channel side is steep-to. Use *great caution* in approaching either side, for the strong tides, and heavy breaking sea in bad weather, would entail certain destruction on any vessel that might be driven on them. Their S.E. side is marked by 3 buoys (see page 110).

Clearing Marks:—Milford ch. seen between the two W. houses of Milford, N.E., leads clear of W. side of Shingles, and E. of E. end of Dolphin bank, the shoalest part of which, 3 fms., is 8½ cables N.W. from the S.W. buoy. Nodes beacon on with junction of *red* and *white* cliffs in Alum bay, E. by S. ½ S., leads S. of Dolphin, and of S.W. prong of Shingles. Hurst high Lt. open its breadth northward of low Lt. N.E. by E. ¾ E., leads to S.W. buoy. Hurst Lts. in line, N.E. by E. ¼ E., clear S.E. side of Shingles as far as (but close to) Elbow buoy; from thence to N.E. buoy, open the high Lt. S. of low Lt.

ALUM and TOTLAND BAYS.—Alum bay, on account of the foul ground in it, is only used by small craft, and to avoid the tide they anchor close inshore, in 3 to 3½ fms., with the junction of the *red* and *white cliffs*, S.E., and Hatherwood low Pt. and Cliffs End in line, N.E. by E. ¼ E. The N. edge of Hill trees open of Hatherwood Pt., leads W. of rocky patches of 3 ft., called the Five Rocks; and the N. end of same trees kept *just* within Warden Pt., leads outside rocky ledges extending off Hatherwood Pt.

Totland bay has excellent anchorage for vessels of moderate draught, particularly in E. winds, when they will be well protected by Tinker and Warden ledges. Little or no ebb is felt, and the flood is not strong. The best berth is in 3½ to 4 fms., sand, with Needles Pt. on with Hatherwood Pt., W.S.W., and Nodes beacon S. ½ E. The least water, 9 ft., on Tinker patches is about ½ m. off shore, with the S. end of Hill trees in line with Warden Pt.

* The navigation of the Needles Channel would be much improved if its leading mark were a Lighthouse placed on Round Tower Pt., and a Light-vessel moored in the position of the Warden Ledge buoy. These objects would be a mile apart—whereas the Hurst lights are so close together, that under some circumstances they are almost worthless as a guide.—J. W. King, Master of H.M.S. *Bellerophon*, 1850.

WARDEN LEDGE.—Between Totland bay and Cliffs End the bottom is foul with rocky ledges, the most dangerous of which, Warden ledge, dries ½ its length at sps. It extends N.N.W. 4 cables from Warden Pt., at which distance the depth is only 9 ft., the lead falling *suddenly* into deep water. A *red* (can) buoy lies in 5½ fms. *close* to its outer edge (see page 110).

Clearing Marks:—Needles Lt.-ho., S.W. by W., or Seonee Pt. open of Round Tower Pt., E. by N., leads outside Tinker patches and Warden ledge. At night, keep the *white ray* of Needles Lt. in sight between S.W. ¾ W. and S.W. by W. ¼ W.

From the Warden to Cliffs End, vessels of even light draught must not approach the shore nearer than to have the whole of Victoria fort on Sconce Pt. open of Round Tower Pt. Give Cliffs End a wide berth, as detached rocks lie upwards of a cable outside it. From hence to Sconce Pt. the shore, if requisite, can be approached to 200 yds.

NORTH CHANNEL, between the Shingles and Hurst beach, is safe at L.W. for vessels not above 15 ft. draught, provided the wind be free enough to use the leading marks. Small craft can turn through, recollecting that the tide rises only 5 to 7 ft., and that the water stands at the high level for 2 or 3 hours (see foot note, page 93). The only dangers are the Mineway, North Head, and Trap.

Mineway, a 11-ft. patch, lies ⅓ m. from the beach abreast Milford. Hurst low Lt., nearly on with the S. end of West Hill trees, S.E. by E. ¾ E., leads well S. of the patch; Milford ch. seen between the two western houses at Milford, N.E., leads ½ cable W.

North Head, a gravel knoll of 9 ft., lies with extremes of Hurst and Seonee Pts. touching, and Milford ch. N. ¼ E. A vessel will be N. of this knoll when Seonce Pt. flagstaff opens N. of low Lt. E. by S. ¾ S.

The Trap is a small pit of sand and gravel thrown up at Hurst Pt. by the eddy on the ebb. It is near the beach and steep-to; give it a *fair* berth.

DIRECTIONS.—Do not attempt the North channel against the ebb, except in a steamer or with a fresh leading wind, when take care that, in hugging Hurst beach to cheat the tide, the vessel is kept outside the eddy off the Trap.

With N. or N.E. winds, a vessel on the ebb might work to the N. with great advantage at the back of the Shingles. Standing E. do not bring Milford ch. N. of N.E., until Hurst Pt. is seen coming on with Seonee Pt. when gradually bring Hurst Low Lt. over S. end of West Hill trees, S.E. by E. ¾ E., which will lead in 17 ft. at L.W. When pretty close up to the beach keep midway between the N.E. buoy of Shingles and Hurst Pt.

HURST ROAD, on N.E. side of Hurst Pt., is open to E. and S.E. winds, and is but seldom used, owing to the strong eddies in it. There is room for a few small vessels out of the tide, but not nearer the beach than to have the middle Needles rock on with E. side of Hurst castle, or just over Hurst Pt.

YARMOUTH ROAD shelters from all but E. winds, especially those

between E.S.E. and N.E. Entering from the W., do not approach nearer the foul ground extending outside the Black rock than to have the high tower of Refuge ho. open N. of Yarmouth old castle S.E. ¼ S. If of moderate draught anchor in 7 fms., good holding-ground, about ⅓ of a mile off shore, with the mast on Sconce Pt. W. by N., and Yarmouth ch. and castle masts in line S. ¼ W. If of large draught take an outer berth in 8 or 9 fms.

The greater part of Black rock dries at L.W. sps. A *red* can-buoy is placed in 10½ fms. a short distance N. of the rock. There is only 6 ft. at L.W. at 47 yds. inside this buoy. (For tides in Solent, see pp. 56 and 93.)

Yarmouth harbour has a quay for small craft, and is well sheltered by a breakwater. The *green* and *white* (gas) Lts. on the quay in one, S.S.W., lead into the harbour in 14 ft. at H.W. sps.

LYMINGTON RIVER flows through the extensive mud-bank fronting the N. shore of the Solent. There is a *chequered red* and *white* can-buoy, in 12 ft. at L.W., on Lymington spit at W. side of entrance; and the edge of the mud bank on W. side of the channel is marked by a large ball *beacon*, called Jack-in-the-Basket, and with perches; the E. side of entrance and of the channel are not marked. For tides, see pp. 56 and 93.)

Entering at H.W., keep Jack-in-the-Basket in line with Lymington ch., N.N.W., until near the *chequered red* and *white* buoy, which pass pretty close, also the perches, leaving them all to port. Abreast the town there is 7 ft. at L.W. sps., and 5 ft. at L.W. nps.

There is better anchorage for small vessels in Lymington road than off Yarmouth, and less tide. Anchor in 5 fms., sand and mud, with Jack-in-the-Basket in line with Lymington ch., N.N.W., and Hill trees on with Norton ho., S.W. ½ W. To avoid the Lymington banks, keep the Needles Lt.-ho. or Lt. shut in with Cliffs End fort, S.W. by W. ¾ W.

SOLENT BANKS are patches of loose shingle lying in the fairway of the Solent, midway between Sconce and Egypt Pts., and having only 22 ft. over the shoalest patch, must be avoided by vessels of large draught. From the 22 ft. the W. edge of Hill farm trees is in line with Yarmouth sand-house, W. by S. ¾ S., and the coast-guard shed at Fish-house Pt. is in line with the large chalk-pit on the distant downs, S.S.E. Hurst High Lt. bearing W., leads S. of the banks. (For tides, see pp. 56 and 93.)

HAMPSTED, SALT MEAD, and GURNET LEDGES.—At 3 m. E. of Yarmouth is Hampsted ledge, which extends 2 cables N.W. from Hampsted Pt. A *red* (can) *buoy* marks its N.E. edge in 5 fms.

Gurnet Hd., 1½ m. W. of Egypt Pt., is high, and off it are rocky ledges. The Gurnet ledges extend ¾ m. E. from the Hd., and nearly parallel to the shore, and at their E. extreme, 2 cables off shore, is a *red* (can) buoy in 8 fms. Egypt ho. open N. of the old limekiln, E. ¼ N., leads outside this buoy, but will not clear the rocks to the eastward in Gurnet bay.

Midway between Hampsted and Gurnet ledges, and nearly ½ m. off shore, abreast Thorness wood, is Salt Mead ledge, of 1½ and 2½ fms. water, much in

the way of vessels hugging the shore to keep out of the tide. A *red* (can) *buoy* marks its N.E. edge in 5 fms. Mount trees at Yarmouth on with Hill farm trees, W. ½ S., clears it, also the gravel banks off Newton river.

BEAULIEU RIVER, on the N. shore of the Solent, has 2 ft. at L.W. on the mud bar at its entrance, but 4 and 5 fms. within, and the least depth is 6 ft. at L.W. up to Buckler's Hard, where sps. rise 10 ft., nps. 7 ft.

The two *red* beacons (on the shore close W. of coast-guard) in one, N. by E. ¼ E., lead in deepest water over the bar; after which the channel is marked by perches.

LEPE MIDDLE, a shoal of 1¾ to 4 fms. lying off Beaulieu river, extends about 1 m. off shore, and near its S.E. edge is a conical buoy in 4 fms., *striped red* and *white vertically.*

Eaglehurst tower open E. of Stansore Pt., N.E, ¼ E., leads E. of Lepe buoy, and over the E. tail of the shoal in 4 fms. Hill Hd. coast-guard, nearly midway between Nelson monument and the large chalkpit on Portsdown hill, E. ¾ N., leads S. of the buoy, and in same depth over the tail of the shoal. The coast-guard will be rather nearer to the monument than to the chalkpit, and will be a little right of N.W. Bramble buoy.

COWES is a great place for yachting, and noted for its shipbuilding yards and drydocks, the principal of which belong to Messrs. White (for dimensions, see page 119), who have docked several 74-gun ships, including the *Melville, Ajax,* and others. Their patent slip will receive a vessel of 500 tons. Cowes harbour carries 9 to 14 ft. at L.W. sps. A buoy marks the spit of Shrape bank at E. Pt. of entrance, but the channel, which is on W. side of the buoy, is only ½ cable wide, and the tide runs strong. (For tides see pp. 56 and 93.)

The anchorage is safe in Cowes road. The depths are 5 to 7 fms., and the only danger to large ships is the Prince Consort shoal.

PRINCE CONSORT SHOAL, of gravel and shells, about a cable long E.N.E. and W.S.W., and narrow, lies 3½ cables E. by N. ¾ N. from the Club-ho. on W. Cowes Pt. It carries 22 to 34 ft. at L.W. sps., the least depth being towards its E. part. A *red* (can) buoy is placed in 4 fms. at 33 yards N. of the 22-ft. patch.

To pass N. of the shoal, keep the end of Ryde pier open of old Castle Pt., S.E. ¼ E.

OLD CASTLE POINT.—The Shrape is a high bank of mud, extending E. from the spit buoy at the entrance of Cowes towards Old Castle Pt., off which it dries upwards of ½ cable. As the water is shoal some distance outside this, a *red* (can) buoy is moored in 3 fms., 1½ cables N. of the Pt. There is only 2 fms. at L.W. a short distance within the buoy.

BRAMBLE BANK is a vast accumulation of sand and gravel which nearly blocks up the entrance of Southampton Water. Within the depth of 3 fms. it is 2½ m. long, E. and W., and 1 m. wide. There is 8 fms. at ¼ m. from its S. side, and 11 and 12 fms. between it and Cowes road. The bank is marked by 4 buoys. (see p. 112.)

The general soundings on the bank are 1½ to 2½ fms.; but near the W. end, about ⅓ m. E.S.E. from the N.W. buoy, is a small knoll which dries at L.W.; and there is the East knoll of 6 ft. lying nearly ½ m. S. by W. from Hill Hd. buoy.

SOUTHAMPTON WATER.—The deep-water space embraces a channel 5 m. long, ½ m. wide, between banks of soft mud which cover at H.W. For 3½ m. of this distance from the entrance, there is 5 to 9 fms. at L.W. Then comes Netley shoal with only 12 ft. on it, but there is 4 fms. in the channel on the W. side of this shoal, and 3 fms. in the channel on its E. side; from thence to the 12-ft. *bar*, the depths are 4 to 5 fms.

Two channels lead to the entrance: one, the E. channel with 14 ft. at L.W. sps., on E. side of Bramble; and the other, the W. or main channel with 5 to 10 fms., on N.W. side of Bramble; but the latter is much narrowed by the Thorn knoll, upwards of ½ m. long, with only 2½ fms. water, which occupies a mid-channel position between Calshot spit and N.W. side of Bramble. The W. edge of the knoll is marked by a buoy, *striped red* and *white*, *horizontally*, and the N. edge by a *red* buoy. Vessels with 22 and 23 ft. draught may run through the E. channel at H.W. The W. channel can be used by any draught at any time of tide. (For directions, see p. 54.)

Calshot Lt.-vessel, moored in 5¾ fms., S.E. ¼ S., 1⅙ m. from Calshot castle, is painted red, has one mast with ball at masthead, and exhibits a *white* light, weich *revolves* every *minute*. A *black Refuge bell* buoy is placed in 4 fms. on the S.E. extreme of Calshot spit, 1 m. S. by E. from the castle, and nearly ⅔ m. W. by S. ¾ S. from Calshot Lt.-vessel; and a conical *black* and *white chequered* buoy, with staff and globe (called Black Jack), marks the E. edge, 4 cables S.E. by S. from the castle.

Red buoys mark the edge of mud bank on the E. side of Southampton Water, and *chequered black* and *white* buoys the edge of bank on the W. side, which latter is steep-to, suddenly breaking down to 7 and 8 fms. On the E. side is Hamble river, navigable for small vessels up to Bursledon bridge, where there is 6 ft. at L.W.; a *red* buoy marks extreme of spit running out nearly 1 m. from N. entrance Pt. The channel up the river Itchen to entrance of Southampton docks has 16 ft. in it at L.W. The E. side of entrance to the river is marked by a *red* conical buoy with staff and globe. For dimensions of docks, &c., see page 119.

There is a double high water (see p. 93), at Southampton, and the knowledge that the high-water level remains stationary for rather more than 2 hours, may, in some cases, be important. The 1st H.W., F. & C., is at 10 h. 30 m., the 2nd H.W. at 12 h. 45 m., and L.W. at 4 h.; sps. rise 13 ft., nps. 10 ft. After L.W. the tide rises for 6½ h., it then ebbs for 1 h. about 9 inches, when it again commences to rise, and in about 1¼ h. reaches its former level, and sometimes higher.

The ebb continues 3¼ h., and falls fastest 2 h. after the 2nd H.W., at which time the stream runs strongest in the fairway. At nps. the tide stands for a considerable time near H.W., but there is no difference in level.

RYDE MIDDLE BANK, between E. Cowes and Stokes bay, is 2 m. long S.E. by E., and ¼ m. wide, and is marked by three buoys—viz., a can buoy, *striped red* and *white, horizontally,* at its W. end, a *chequered red* and *white conical* buoy on its E. edge, and a *red conical* buoy with *staff* and *globe* on its N.E. edge; the latter is a good mark for the northern edge of the bank, but it is placed principally as a guide in turning a long vessel after running the Measured Mile in Stokes bay. The general depths on the bank are 2¼ to 2¾ fms., mud, gravel, sand, and shells, and there is 6 fms. close to. The least water, 2 fms., is ⅔ m. within the buoy on W. end, which is E. by N. $\frac{6}{10}$ m. from Old Castle buoy.

STURBRIDGE BANK, between Ryde and Gilkicker Pt., is ⅔ m. long S.E. ½ E., very narrow, and the least water on it is 16 ft. The W. extreme is marked by a can-buoy, and the E. extreme by a conical buoy, and both are *striped black* and *white horizontally.* The W. extreme is S.E. ½ E., 2¼ m. from the E. buoy of Ryde Middle.

PEEL and MOTHER BANKS, in the bight between E. Cowes and Ryde, extend S.E. by E. 4½ m. from Old Castle Pt., and terminate in an Inner spit, between the Sturbridge and Ryde sand, and in an Outer spit, the extreme of which in 3 fms. is ⅔ m. W.N.W. from W. buoy of Sturbridge. These banks carry 1½ to 2½ fms. at L.W., and have 5 fms. on their outer edge, which abreast Wooton creek is 1¼ m. off shore. A *red* can-buoy lies in 20 ft. at 1 m. off shore on the outer edge of Peel bank.

QUARANTINE GROUND is on the Motherbank, N.N.W. of Ryde, and its limits are marked by 5 buoys. The deep water, 4 to 5 fms., is near the Lazaretto hulk, moored in 5 fms. Vessels in pratique anchor between the Sturbridge and Outer and Inner spits of Motherbank in 5 to 11 fms., clean good ground, and sheltered from the S., with Ryde bearing from S.W. to S.S.W.

RYDE.—Two piers, 200 yds. apart, extend from the town; the W. pier is for passengers, the E. pier for railway traffic from pier in Stokes bay. The W. or old pier is 800 yds. long, 22 ft. wide, and has 7 ft. at pier-end at L.W. sps. The E. pier is 400 yds. long, 30 ft. wide, with 4½ ft. water at pier-end. Sps. rise 13½ ft., nps. 10 ft., and nps. range 6½ ft.

Five sets of screw moorings are laid down on each side of E. pier. On the shore between the piers is a tidal basin and dry-dock. The basin, 220 ft., long, 110 ft. wide, has 8½ ft. in it at H.W. sps., 5½ ft. at nps. The dock, 250 ft. long, 20ft. wide at entrance, has 8 ft. over sill at H.W. sps., 5 ft. at nps.

STOKES BAY.—A pier, 200 yds. long, 20 yds. broad, runs off from the shore of this bay. The pier-hd. is diamond-shaped, 80 yds. long, 30 yds broad, and there is 6 ft. alongside it at L.W. sps.

MEASURED MILE.—The two *beacon* buoys, painted *white* with *red staff* and *globe,* moored N.W. and S.E. of each other off Stokes bay, are for the purpose of indicating the course of the *Measured Mile.* The buoys are placed a cable's length from either end of the *Measured Mile,* the limits of which are shown by *beacons* on the shore; but as the course between the buoys

is not more than 1½ cables outside the bank of 3¾ fathoms in Stokes bay, ships of heavy draught should not turn inwards or towards the shore.

DIRECTIONS through NEEDLES. — With Portland Lts. in line, N.W. by N. distant 5 m., or Shambles Lt. N.E. by N. 3 m., an E. course for 30 m. will (allow for tide) take a vessel 2 m. outside St. Albans Hd., 1½ m. outside Durlston Hd., and towards the Needles Channel. (For tides, see pp. 55 and 93.)

If of moderate draught, and the sea is smooth, the Hurst Lts. in line, N.E. by E. ¼ E., will lead over the Bridge in 24 ft. at L.W. sps.; but remember that, as these Lts. are so close together, this mark *may* lead but little W. of a 19-ft. rock (see page 46). As the Elbow buoy is approached open Hurst high Lt. its breadth S. of low Lt., but do not bring the Needles Lt.-ho. W. of S.W. by W. until the whole of Victoria fort on Sconce Pt. opens of Round Tower Pt., to clear Tinker, Warden, and How ledges; then borrow a little towards the island shore to avoid the eddies off Hurst.

If of heavy draught, steer towards the S.W. buoy of Shingles with Hurst high Lt. open its breadth northward of low Lt., N.E. by E. ¾ E., until S. edge of Hill farm trees is *just* within or S. of Warden Pt., E. ¾ N. This latter mark leads through the 5-fms. channel between S.W. buoy and Bridge, and when Hurst Lts. come in line proceed as before.

Nodes beacon on with junction of red and white cliffs in Alum bay, E. by S. ½ S., or Needles Lt.-ho., E. by S. ¾ S., lead also through this channel, and when Hurst Lts. are in line, proceed as before.

A handy vessel under able management can turn through the Needles. The Shingles is the safe side on the flood, the island side on the ebb. It would be better on the ebb, when abreast Hurst beach, to throw the vessel's head towards the island and drop out with the tide.

AT NIGHT, remember that the Needles Lt. shows *white* in the direction of entrance of Needles channel; that is, its S. limit bearing E. ¼ N. passes 1½ m. S. of Durlston Hd.. and 2 cables S. of the outer part of the Bridge; and that its N. limit E. by S. ¾ S. passes 2 cables S. of Dolphin bank and 1½ cables S. of S.W. buoy of Shingles. The ray of white Lt. thrown towards Hurst, bearing between S.W. ¾ W. and S.W. by W. ¼ W., is to clear Warden ledge and Shingles (see p. 100).

As a general rule a stranger should never attempt to enter unless Hurst Lts. are in sight, and always have an anchor ready. If the vessel is of moderate draught, cross the bridge with the Lts. in line N.E. by E. ¼ E. When nearing the Elbow, or when Needles *red* Lt. bears S.S.W., open Hurst high Lt. a little S. of low Lt.

After passing the Elbow, a safe way is to keep just within the N. limit of the ray of Needles white Lt., S.W. ¾ W., which will clear the Warden. As the vessel nears Hurst take care to avoid the eddy off that point on the flood, and the indraught of the North channel on the ebb.

If of heavy draught, steer in under easy sail with Hurst high Lt. N.E. by E. ¾ E., and the *first* cast under 10 fms. at L.W. will be a warning

that the vessel is 1 m. from the S.W. buoy, and that the Needles Lt. is about to alter from red to white. Keep Hurst Lt. on this bearing, the water shoaling to 6 or 5 fms., until Needles *white* Lt. bears E. by S. ½ S., then edge *quickly* to the E. to get Hurst Lts. in line, when proceed as before.

Proceeding *outwards* on the ebb, when abreast Hurst, keep just within the N. limit of ray of Needles *white* Lt., bearing S.W. ¾ W., until clear of Warden, when open Needles *red* Lt. a little, taking care to keep Hurst high Lt. open S. of low Lt. until well below Elbow buoy, or until Needles Lt. bears S.S.W., when proceed with Hurst Lts. in line over the Bridge; or if the vessel is of large draught, proceed towards the Bridge with the Lts. in line, and *directly* Needles Lt. changes from red to white haul out W.N.W. to avoid the Bridge. The ebb sweeps strongly over the Shingles from Hurst to abreast Totland bay.

DIRECTIONS through the SOLENT to SOUTHAMPTON and SPITHEAD.—Egypt Pt. bears East 9½ m. from Hurst Pt. A vessel of large draught had better pass S. of Solent banks, and she will do so by keeping about ½ m. from the island shore. At night, Hurst high Lt. kept on a W. bearing will lead S. of these banks. Hill farm trees on with E. end of N. side of Yarmouth, and well open N. of Mount trees at Yarmouth, W. ¾ S., leads in fairway from off Hampsted Pt. to Egypt Pt.

Turning to Windward,—to avoid the long mud flats on N. shore, do not bring Hurst high Lt. S. of W. ½ S. until abreast Egypt Pt., nor shoal to less than 6 or 7 fms. To avoid the ledges on S. shore between Hampsted and Egypt Pts., keep a good ½ m. off shore, and do not shoal to less than 8 or 7 fms.

If *bound to Southampton,*—Calshot Lt.-vessel or Lt. kept on an E.N.E bearing (when it will appear a little S. of the black Refuge bell-buoy on Calshot spit), will lead through the main channel on W. side of Bramble, between buoys on Thorn knoll and Refuge bell-buoy.* When about 2 cables W. of Lt.-vessel, or when Calshot castle bears N.N.W. ½ W., steer to bring the Lt.-vessel astern S. by E. ½ E., steering N. by W. ½ W. in mid-channel, leaving the chequered *black* and *white* buoys to port, and *red* buoys to starboard. The two Lts. on the dock pier-hds. in one, N.N.E. ¾ E., lead up the Itchen in 16 ft. at L.W. sps., to entrance of docks.

To sail through the channel on E. side of Bramble, keep Calshot castle twice its breadth open S. of Calshot Lt.-vessel, N.W. ½ N., passing 1 cable eastward of E. Bramble buoy, and close to W. side of Hill Hd. buoy; then passing 2 cables W. of Lt.-vessel, proceed as before.

Bound to Spithead, S. of Ryde Middle,—pass through Cowes road (if of heavy draught pass N. of *red* buoy on Prince Consort shoal), and between *red* buoy off Old Castle Pt. and the buoy *striped red* and *white horizontally* on W.

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* Eaglehurst tower kept on a N ½ E. bearing until the Lt. vessel bears E.N.E., or a remarkable three gable red brick house (which is about 2 m. N.E. of Hill Hd.), a sail's breadth open N. of Lt.-vessel, E.N.E. nearly, will lead to the entrance of this channel; then either of these marks will clear the Thorn and lead up to Lt.-vessel.

NEEDLES & SOLENT CHANNELS
AND
SPITHEAD.
0 1 2 3 MILES
ISLE OF WIGHT
Fawley
Calshot Castle
Calshot
Luttrell's Tower
Beaulieu R.
Stansore Pt
St Leonards Abbey (ruins)
Lymington Riv.
Sir H. Neales Monument
LYMINGTON
Nash Pt
CHRISTCHURCH
Highcliff
Nash
Barton
Taddiford
Milford
Priory Ch.
R. Stour
Christchurch Hd
CHRISTCHURCH BAY
North Ch.
Christchurch Ledge
Tower open of Christchurch Hd
Dolphin
Needles Channel
Solent Channel
Hurst Castle
High Lt
Yarmouth
Beldnor
Hill Trees
Warden Pt
Freshwater
Freshwater Gate
Chalk Pit
Freshwater Bay
Needles Lights
Needles Light 80 feet, appears red when it bears from N.W.¾N round north & east to S.W.¾W. except between E¼N & E.b.S½S, when it shows white, it is also white between S.W.¾W and S.W. by W.¾W. but not seen upon any more westerly bearing.
S. Edge of Hill Trees E¾N. seen just S of Warden Pt leads through in Midchannel
E¼N
E.b.S½S.
Brook
Mottestone
Brixton
Chilton
Brook Pt
Dangerous
Blackwood Pt
Ship Ledge
Atherfield Pt
Atherfield Ledges
Chale
Chale B.
Blackgang Chine
St Catherine Hill
St Catherine Pt
Red Light seen between W½N and E½N
Overfalls
St Lawrence
Niton
Ventnor
Bonchurch
Week Down 704 ft
Worsley Obelisk
Appuldurcomb Hill
Cook's Castle
Shanklin
Dunnose
Church Rocks
Sandown
Sandown Bay
Yarborough Tr
Yaverland
Queen's Bower
Ashey Down Tower 463 feet
Brading
Brading Haven
Foreland
Bembridge Pt
Culver Cliff
Princessa
Outer Nab
Nab Lt F
Bullock Patch
St Helens
St Helens Road
Nettlestone Pt
Ryde
Ryde Sand
Ryde Mill
Wootton
Wootton Bridge
Whippingham
Osborn
East Cowes
West Cowes
Medham
Northwood
NEWPORT
Medina Riv.
Newtown
Thorness
Hamstead
Gurnet Head
Gurnet Ledge
Bramble
W. Middle
E. Middle
Middle
Old Castle Pt
Peel Bk
Mother Bk
Spithead
Spit
Horse Sand
Horse Elbow
Dean Elbow
Dean Tail
Warner
South Sea Castle
Bar
Hayling Knob
West Pole
East Pole Sand
Lee Point
Lee Farm
Ft Rowner
Ft Grange
Ft Gomer
Ft Brockhurst
Gosport
Stoke Bay
Titchfield R.
Hill Head
Graton
Mearns
PORTSMOUTH
PORTSEA ISL.
Southsea
Langston Harbour
North Hayling
Hayling I.
South Hayling
Chichester Harb.
Thorney
Magnetic
Varn 19°44'W.

extreme of Ryde Middle; then steer to bring Egypt Pt. *just* opening of Old Castle Pt., W.N.W., and this mark on astern will lead to Spithead.

To sail N. of Ryde Middle,—pass through Cowes road and N. of W. buoy of Ryde Middle, then steer eastward with the tower of Southsea castle well open N. of Monkton fort, E.S.E., until N.E. buoy of Ryde Middle bears S. by E., then steer S.E. ½ E. for Spithead. To pass outside the banks of 3¾ fms. in Stokes bay, keep Calshot castle open S. of Calshot Lt.-vessel, N.W. ½ N.

To sail N. of Ryde Middle from Spithead,—steer N.W. between the shore of Stokes bay and N.E. buoy of Ryde Middle until the tower of Southsea castle is open N. of Monkton fort, E.S.E.; this mark on astern leads between Ryde Middle and Bramble. When abreast the W. buoy of Middle, steer for Egypt Pt., then W. for Hurst.

To sail S. of Ryde Middle,—steer westward from Spithead with Egypt Pt. *just* opening of Old Castle Pt., W.N.W., until abreast the E. buoy of Ryde Middle, then keep these Pts. *alternately* open and shut for fear of getting too near that shoal. When the W. buoy of Ryde Middle bears about N.N.W. steer N.W. or more northerly, to avoid the ledge off Old Castle Pt., till Egypt Pt. bears W. ¾ N., then steer W.N.W. till abreast it.

Turning to Windward,—the Sturbridge and Gilkicker Pt. are steep-to; a vessel of large draught may stand towards them into 10 fms. at L.W.; into 7 fms. towards Motherbank and to both sides of Ryde Middle; into 9 or 8 fms. towards Stokes bay; into 9 fms. towards Bramble; and into 8 fms. towards Old Castle and Egypt Pts.

TIDES.—At the Needles sps. rise 7½ ft., nps. 5 ft., and nps. range 2½ ft. At F. & C. the flood makes at 3 h. 40 m., the ebb at 10 h. Their rate is 2 kts. outside the Bridge, 3 to 4 kts. over the Bridge and in Needles channel, 5½ kts. between Round Tower and Sconce Pts., and 4 kts. in N. channel.

The direction of *flood* is S.E. ½ E. at ¼ m. outside the Bridge, and no indraught will be felt unless the vessel is *within* that distance of the Bridge. In the Needles channel it runs S.E. by E. ¼ E. towards Needles Lt.-ho., but midway between Lt.-ho. and S.W. prong of Shingles it *abruptly* turns to the E., sweeping the island shore. Between the Shingles and island it runs fairly up in mid-channel. Near the edge of Shingles it sets right off that bank into the channel for some distance before it runs to the E. Its confluence with the flood through the N. channel takes place about 2 cables S. of Hurst Pt., causing off that Pt. a strong eddy, in which a vessel would become totally unmanageable.

The *ebb* splits about ⅓ the way between Cliffs End and Hurst Pt., one part running through the N. channel, the other setting obliquely across the Shingles between N.E. and Elbow buoys. Anywhere between Warden buoy and Sconce Pt., a vessel will be more or less affected by the influence of N. channel tide. Between Warden buoy and Hatherwood Pt., in mid-channel, the ebb takes the course of the deep water. Abreast this Pt., the influence of the outset begins to be felt, and in calm weather it would take a vessel safely through the channel

between the Bridge and S.W. buoy. Its direction is W.S.W. across the Bridge, and W. by N. ½ N. about ½ m. outside.

It will be seen from the above that all danger on the flood is on the island side; and that a vessel's safeguard in light winds on the ebb, is to keep well over on the island shore until abreast Warden buoy; from thence the tide will set her clear of Shingles.

As stated in p. 93, the W. stream through Spithead has great influence over the rise and fall of tide in the Solent. With spring-tides there are two high-waters in Cowes harbour. At F. & C. the 1st H.W. is at 10 h. 45 m.; the tide then falls 1 or 2 inches, and again rises 2 or 3 inches, and makes a 2nd H.W. at 11 h. 45 m.; the tide then falls till L.W., which is at about 4 h.; during neaps there is only one H.W. (The times of the two high waters at Hurst, Yarmouth, and Lymington are given in Tide Table, page viii., and at Southampton at p. 51.)

At the Solent banks the W. stream, at F. & C., commences at 9 h. 30 m.; the E. stream at 4 h.: rate 3½ to 4 kts.

In Cowes road, the streams make at 9 h. 50 m., and 3 h. 30 m.; rate 3 to 3½ kts. A spring-tide falls 2½ ft. lower, and rises 2½ ft. higher, at Lepe and at Cowes, than at Yarmouth or Hurst.

At Spithead anchorage it is H.W., F. & C., at 11 h. 20 m., and L.W. at 4 h. 25 m. Here, and anywhere between the Bramble and Horse, the stream makes to the west at 9 h. 0 m., and to the east at 2 h. 0 m. (See p. 64.)

EASTERN ENTRANCE TO SPITHEAD.

VARIATION, 19° 45′ W.

PRINCESSA SHOAL, an irregular rocky patch with 3¼ to 5 fms. over it, is (assuming the depth of 5 fms. for its limits) 1¼ m. long E. by S. and W. by N., and near its W. end upwards of ½ m. wide. The least water is near its N.W. edge, where there is a ridge of 19 ft.; and as there are shoal hds. of 22 to 24 ft. on the other parts, it should not be crossed by large ships. A buoy, *striped black* and *white vertically,* is placed in 32 ft. on its N.W. edge, and a *chequered black* and *white* buoy (conical with staff and cage) in 29 ft. on its S.E. edge.

Clearing Marks.—The red clay cliff in Sandown bay well open S. of Culver cliff, N.W. by W. ¾ W., or the sharp N. shoulder of Appuldercomb hill in line with Shanklin railway-station, W. ⅓ N., leads S. of Princessa,—Southsea castle on with Horse fort, bearing North, or Warner Lt., N. ¼ W., clears the E. end in 5 fms.,—and the spire of Bembridge ch. on with Foreland farm, N.W., leads N.E. in 5 fms. At night or in thick weather do not shoal towards the Princessa to less than 10 fms. at L.W.

BEMBRIDGE LEDGE, extending ¾ m. from Bembridge Pt., has only

18 ft. on its outer edge at L.W. At 1½ cables S. of the outer edge is a *chequered black* and *white* (can) buoy moored in 4 fms. A large portion of the ledge dries at ½ tide.

NAB ROCK.—Nab shoal is the name given to the rocky bottom eastward of Bembridge ledge. It is about 1 m. long N.W. and S.E., and ¼ m. broad, and has numerous shoal spots of 25 to 27 ft., and one small head, called the Nab rock, of 23 ft. *Marks* for the Nab rock, which has a buoy, *striped black* and *white horizontally*, lying ½ cable S.E. of it,—Bembridge Pt., W. ¼ N. 1½ m. Lane End farm on with centre of large chalkpit on Brading down,* W. by N.; Nelson monument just open E. of St. Paul's ch., Southsea, N.; Warner Lt. N. ¾ W. 2½ m.; and Nab Lts. E. ½ N. 1½ m.

Nab Lt.-vessel, moored in 5¼ fms. close to E. edge of the most eastern of the patches off Bembridge Pt., exhibits two *fixed* Lts. on masts 54 ft. apart. The Lt. on mainmast is 38 ft., and that on foremast 28 ft. above the sea.

OUTER NAB is a small rocky patch of 27 ft., from which Nab Lts. bear N.E. ¾ N. 1½ m., Warner Lt. N. by W. ½ W. 3¾ m., and Bembridge mill is on with N.E. end of Foreland village, N.W. by W ¾ W. *Clearing Marks:*—The above mill on with S.W. end of the village, N.W. by W. ¼ W., leads S. of patch; and Bembridge ch. on with Lane End farm, N.W. by W. ¼ W., leads N.

NEW GROUNDS are patches of gravel, sand, and shells, which have possibly been heaped up by the meeting of the tides, N.E. of Nab rock (see p. 93); the least water, 27 ft., is ⅔ m. N.E. from the rock, and W. by N. ½ N. about 1 m. from Nab Lts. As there are many 5-fm. patches and less in this locality, *it should be borne in mind, when piloting large ships*, that they are all comprised within the following limits—viz., the N. shoulder of Appuldercomb hill, in line with Shanklin railway-station, W. ⅓ N., and Nab Lts. N. by E.

ST. HELENS ROAD has good holding-ground, mud and stiff clay, and is only open to S.E. In a vessel of large draught anchor in 7 fms., with Ashey down tower in line with St. Helens Sea Mark, or the tower open S. of Bembridge fort W. ⅓ N., Warner Lt. N. ¼ E., and Nab Lts. S.E. by E. ½ E.; but smaller vessels can anchor farther in with former marks on W. ⅓ N., according to draught of water.

DANGERS IN ROAD.—**Cole** rock and **Dawe** banks lie on N. part of Bembridge ledge. Cole rock dries in several hds. at L.W. sps. Dawe banks, lying between Cole rock and Bembridge buoy, have 8 ft. on shoalest part.

Long rock is a considerable extent of foul ground with shoal hds. of 23 to 25 ft. on it, lying N.W. of Nab shoal.

St. Helens Patch.—A bank extends E.N.E. 1½ m. from St. Helens Sea Mark, at which distance there is only 26 ft., rapidly deepening to 10 and 11 fms. St. Helens patch, of gravel and stones, with 17 ft. over it, and 22 ft. on

* Brading down has a remarkable single tree near its highest Pt. Lane End farm stands a little N. of Bembridge Pt.

W. side, lies ½ m. within the 26 ft., with Ryde ch. just shut in with Nettlestone Pt., N.W. ¾ W., and the coast-guard mast on S. side of Brading in line with E. Chalkpit on Bembridge down, S.W.

Clearing Marks:—Chalk quarry on with Blackrock watch-ho. W. ¾ S., leads in 2 fms. S. of Dawe banks. St. Helens ch. open ¼ point N. of St. Helens Sea Mark, N.W. ¼ W., leads N. of Cole rock and Dawe banks. When N. of Cole rock, or when Culver cliff is well open N. of Foreland farm, St. Helens ch. should be opened more of the Sea Mark, to clear the tail of the shoal extending some distance N. of Cole rock.

St. Helens Sea Mark in line with the summit of Brading down, W. by S., leads S. of St. Helens patch; and Ryde ch. open of Nettlestone Pt., N.W. ¾ W., leads N. Large ships should not shoal towards it to less than 10 fms.

DIRECTIONS.—The channel between the Princessa and Bembridge ledge is ½ m. wide, and safe for vessels of moderate draught *with a leading wind*; but the tides are strong, and the W. stream sets over Bembridge ledge.

Nab Lt.-vessel kept on an E. by N. ¾ N. bearing, will lead over Culver spit in 4¾ fms., and through the channel in 5 or 5½ fms. at L.W., passing ¼ m. N.W. of N.W. Princessa buoy. When abreast Bembridge buoy haul northward when Horse fort opens its breadth W. of St. Judes church spire at Southsea, N. ¼ E., which mark leads between Nab rock and Bembridge ledge in 7 fms., over Nab shoal in 4¼ fms. at L.W., 2 cables E. of Warner Lt., and up to the leading into Spithead—viz., Kickergill tower in line with centre of fort Monkton, N.N.W. ¼ W.

AT NIGHT do not attempt this channel; but if unavoidable, steer in with Nab Lts. E. by N. ¾ N., and when Warner Lt. bears N., steer for it on that bearing, which will lead between Nab rock and Bembridge ledge; when the *green* Lt. in Bembridge fort bears W. ⅓ N., or Nab Lts. S.E. by E. ½ E., anchor in 6 to 8 fms. in St. Helens road, or proceed on to Spithead, passing E. of Warner Lt.

If wishing to pass E. of Nab rock,—continue E. by N. ¾ N. towards Nab Lts., and when Warner Lt. bears N.N.W. or N.W. by N. (according to the vessel's draught, see p. 60), keep her so till Nab Lts. bear S.E. by E. ½ E., which bearing kept on astern leads into St. Helens road, N. of New Grounds.

BRADING HAVEN can only be used by vessels of light draught, as most of the banks within have not more than 4 ft. over them at H.W. sps. Abreast the outer beacon at the entrance is a bar of sand and gravel, which *dries* 1 ft. at L.W. sps.; 12 or 13 ft. may be carried over it at H.W. sps. Within the entrance Pts. a few small vessels of 5 or 6 ft. draught can lie afloat in a small hole on S. side. A narrow intricate channel leads up to Brading quay, where sps. rise 9 ft. At N.E. extreme of bank extending off S. Pt. of the Haven, is Bembridge fort, 50 yds. in diameter, and from its N.E. side is shown a *green* light.

WARNER BANK, lying E. ½ S. 1$\frac{6}{10}$ m. from Nettlestone Pt., is of hard sand, gravel, and shells, 2 cables long N.N.E. and S.S.W., ½ cable broad, and carries 16 ft. least water. Its N.E. side *is steep-to*, the water deepening from

17 ft. to 11 fms., at about 60 yds. from the edge. The Lt.-vessel, in 13 fms. on the E. side of bank, exhibits a *white* Lt. which *revolves* every *minute*.

NO-MANS LAND (a more dangerous bank than the Warner) has only 7 or 8 ft. near its E. end, and 9 ft. over other parts at L.W. Its E. edge is steep-to, the lead *dropping at once* from 9 ft. to 16 fms., and unlike the Warner there is no channel between it and the island at L.W., except for vessels of very light draught. Its surface, gravel and shells, is hard, and dangerous to ground on; the bottom between it and the island is mud and weed. Near its E. extreme is a fort, 70 yds. in diameter, and from it is shown a fixed *red* Lt. Ships should not approach the fort within 2 cables.

Clearing Marks:—Kickergill tower on with W. end of Fort Monkton barracks leads E. of No-mans Land bank; but when approaching its E. edge, on no account open Nelson monument W. of E. side of entrance to Portsmouth harbour.

RYDE SAND uncovers at L.W. nearly 1½ m. in a N. ¼ W. direction from Nettlestone Pt., where a *chequered black* and *white* buoy is placed in 28 ft. on its outer edge. Approach the outer edge with caution, as it is steep-to. A vessel may stand towards it into 10 fms., but on no account pass S. of the buoy. Quor ho. in line with end of Ryde pier, W. ½ N., just clears its N. edge.

HORSE AND DEAN SAND, of coarse sand mixed with gravel and broken shells, is the extensive flat fronting the shore from Southsea castle to Hayling island. It has but 6 to 9 ft. over the shoalest parts, and would be dangerous to approach were it not for the 4 *black buoys* and the Horse fort with its *fixed white* Lt. which mark its outer edge. (see p. 114.)

SPITHEAD ANCHORAGE.—The limits of the best anchorage are, Southsea castle from N.E. to E. by N., and Gilkicker Pt. from N.N.W. to N.W. A good berth for large draught is in 10 to 12 fms., with Kickergill tower on with the red and white mile mark on W. end of Monkton barracks, N. by W. ¾ W., and Southsea castle Lt.-ho. on with N. end of Spit fort, N.E. by E. ½ E. Moderate or light draught may take a berth nearer Spit sand, in 7 fms., but do not open Kickergill tower eastward of E. end of barracks. Single anchor with a long scope of cable out is the best; if moored have open hawse to the S.

DIRECTIONS from DUNNOSE to SPITHEAD.—Large ships, before they exceeded 23 or 24 ft. draught, could cross the 4¾-fm. patches lying eastward of Bembridge Pt. at low water, provided the sea was quite smooth; but since they now exceed that draught by 4 or 5 ft., they cannot do it even at half-tide if there is any swell, but must pass outside all the patches. As this could only be done by bearings of indistinct landmarks, and by compass courses across the tide, the Nab Lt.-vessel was removed (Jan. 11, 1865) to the outer edge of the most eastern patch; and by keeping her north of a N. by E. bearing, and rounding her at ⅓ m. to the eastward, vessels of large draught can now steer for Spithead regardless both of the scend of the sea and the state of the tide. (For Directions from St. Catherine Pt. see pp. 3 and 46.)

From 1 m. off Dunnose to 1 m. S. of Princessa, the course and distance is E. by N. ¼ N. 6¾ m., varying according to wind and tide. When nearing the

Princessa, if the vessel is of large draught, steer to the N.E., not passing N. of the Princessa clearing marks—viz., the red clay cliff (next cliff W. of Culver cliff) well open S. of Culver cliff, N.W. by W. ¾ W., or the sharp north shoulder of Appuldercomb hill in line with Shanklin railway-station, W. ⅓ N.—until Nab. Lts. bear N. by E. Steer for the Lts. on this bearing, pass a cable E. of Lt.-vessel, and then steer for No-mans Land fort, about N.W. ¼ N., until Kickergill tower comes on with middle of fort Monkton, N.N.W. ¼ W., which is the leading mark into Spithead. Keep this latter mark on till the large chalkpit on Portsdown hill is in line with Southsea castle, N.N.E., when the vessel will be W. of the Horse, and may take up any convenient anchorage.

At L.W. springs, during bad weather, and with a heavy sea, it will be prudent for vessels of heavy draught to approach the Nab Lts. from a more easterly direction, to preserve a depth of not less than 6 fms. To do so, pass ⅔ m. S.E. of Lt.-vessel, and then steer towards Dean Tail buoy, until Warner Lt. bears N.W. ½ W., when proceed for her on that bearing until the leading mark for Spithead comes on.

Vessels having cleared the Princessa (see p. 56), if *their draught will admit*, may haul northward, and steer for the channel between Bembridge ledge and Nab rock (see p. 58), or may still pass over the shoal patches of New Grounds, avoiding the Outer Nab (27 ft.) and the Nab rock (23 ft.), which can be done by bearings of the Nab and Warner Lts. Warner Lt. bearing N., leads in 26 ft. at L.W. sps. between Bembridge ledge and Nab rock,—bearing N. ¾ W. it points to Nab rock,—bearing N. by W. it leads in 28 ft. ¾ cable E. of the rock and of the buoy—and by keeping the Lt. to *the westward* of N. by W., a vessel will not have less than 26 ft. in passing over the shoal patches between Nab rock and Nab Lts. When about 1 m. distant from Warner Lt., steer to bring Kickergill tower on with the centre of fort Monkton, N.N.W. ¼ W.

DIRECTIONS from OWERS to SPITHEAD.—Owers Lt.-vessel to Nab Lt.-vessel, N.W. ¾ W., 12¾ m.; the Boulder buoy is on the same bearing, and about halfway between the Lt.-vessels.— When navigating between the Owers and Spithead, recollect that both ebb and flood streams set *obliquely* across the vessel's course. If Nab Lts. are in sight, steer from them on a N.W. ½ N. bearing—or steering N.W. ½ N. from 1 m. S.W. of Boulder buoy, should take a vessel ½ m. S. of Bullock patch buoy, and midway between Dean Tail buoy and Nab Lts., when proceed as before. If the vessel's draught will permit, she can pursue the route between Nab Lts. and Bembridge Pt.

Turning to Windward.—The Princessa will be avoided by keeping the red clay cliff in Sandown bay well open S. of Culver cliff, N.W. by W. ¾ W., or by keeping S. of the line of the sharp north shoulder of Appuldercomb hill on with Shanklin railway-station, W. ⅓ N. A ship will pass E. of all shoal patches of 5 fms. and less off Bembridge Pt., by keeping Nab Lts. north of N. by E.—and by not bringing them west of N.W. by W., will pass S. of Bullock patch. When E. end of large chalkpit on Portsdown hill is in line with E. end of Cumberland fort, N. by W. ¼ W., she will be W. of Bullock

patch, and in standing northward may bring Warner Lt. as far as N.W. by W. till Nab Lts. are S.W. ½ W.

Stand towards Dean tail to 8 fms. at L.W., keeping Asheydown tower *well* open S. of St. Helens Sea Mark, W. ⅓ N., or Warner Lt. north of N.W. by W. Standing *westward* into St. Helens road, Bembridge Pt. S.W. by S., or Warner Lt. N., is quite far enough for a vessel of large draught. Standing towards Nab shoal and New Grounds, go about when Bembridge fort bears W. by N. ½ N.

Stand between Deal Tail and Deal Elbow to 8 fms. at L.W.; between Deal Elbow and Dean to 8 fms., until within ¼ m. of the latter, then to 9 fms. From thence westward the channel is narrow, *the shoals steep-to*, and the water should not be shoaled to *less* than 15 fms. on *either* side until past No-mans Land fort; from thence 12 fms. is safe up to E. end of Sturbridge. The Horse and No-mans Land forts stand near the edges of their respective shoals, but it will be prudent to give them a berth of 2 cables in passing.

Kickergill tower on with W. end of Fort Monkton barracks leads outside Warner; and the same tower turned from end to end of barracks clears the shoals on both sides: but vessels of large draught must not bring the tower to the *extreme* of W. end of barracks, but go about when it is *twice its own breadth within* the end, until the vessel is ¼ m. N. of Warner Lt., when the tower may be brought on with W. end of barracks, but do not shoal to less than 15 fms., and *pay strict attention to the lead and the set of the tide.*

There is a safe passage ¾ m. wide and more out of the tide inside the Warner. A vessel will carry not less than 19 ft. at L.W. through, by keeping Kickergill tower on with No-mans Land fort N. by W. ⅓ W., until Spit fort and the Round tower at Portsmouth Pt. are in line, N. ¼ E.; the latter mark leads between No-mans land and Warner, into fairway channel to Spithead. Working through, do not stand farther W. than to have Nelson monument on with E. side of entrance of Portsmouth harbour, N. ¾ E.; but recollect that this mark leads close to No-mans Land.

Vessels of small draught will cheat the tide by passing over the Horse sand. From ½ flood to ½ ebb, a vessel of not more than 12 ft. draught can borrow on the Horse as long as Blockhouse fort is open of Southsea castle; if under 9ft. draught she may do so from ¼ flood to ¾ ebb.

AT NIGHT.—Vessels of moderate draught, from abreast Dunnose, should steer eastward from St. Catherine Lt. just open of the land about W. by N., until Nab Lts. bear N.E. ½ N.; or being about 1 m. off Dunnose, an E. by N. course will lead about the same distance outside Princessa, taking care not to stand into less than 10 fms. at L.W. until Nab Lts. bear N.E. ½ N., when steer for them on that bearing, until Warner Lt. bears N.N.W., when alter course for it. After passing Warner Lt. at a convenient distance on its E. side, proceed in mid-channel about N.N.W. between the Lts. on Horse and No-mans Land forts, and anchor at Spithead in about 6 fms., with Warner Lt. S. by E. ½ E., and the *green* light on Southsea castle N.E. ½ E.—edging in or out as convenient. When Southsea castle Lt. is first seen N. by E., it will

appear *red;* the vessel will then be W. of Horse sand, and have the harbour channel open. The line of bearing on which the Lt. changes from red to green is N.E. by N.

In ships of heavy draught, from a position off Dunnose, with St. Catherine Lt. just in sight W. by N., and Nab Lts. N.E., steer N.E. by E. ½ E. until Nab Lts. bear N. by E., when steer for them on that bearing; by doing so all the shoal patches of 5 fms. and under in the vicinity of the Outer Nab will be avoided. After rounding Nab Lt. vessel at a convenient distance on its E. side, steer for Warner Lt. on a N.W. bearing, and when Spit fort Lt. opens out W. of Horse fort Lt., a N.N.W. ½ W. course will lead between Lts. on Horse and No-mans Land forts, and through to Spithead.

PORTSMOUTH HARBOUR.—Spit Sand, coarse sand and gravel, has 7 to 10 ft. over it, but there are some spots which nearly dry at L.W. sps. There are no buoys to mark its W. side, but on its E. side are the following 6 *chequered black* and *white* can-buoys, which also mark the W. side of entrance channel:—Spit (Refuge bell) buoy in 22 ft. on S.E. extreme of Spit sand; No. 1 buoy in 30 ft. near S.E. Pt. of Elbow; No. 2 buoy on E. side, and No. 3 buoy on inner shoulder of Elbow. No. 4 in 15 ft., and No. 5 in 18 ft., lie nearly in a straight line between No. 3 buoy and Blockhouse Pt.

A *chequered black* and *white* buoy (marked Outer Spit) is placed on S.E. part of bank extending off Spit sand, in 3½ fms. There is about 20 to 23 ft. over the bank between this buoy and the Spit Refuge buoy, but vessels of heavy draught, on entering or leaving the harbour, should, unless near high water, pass S. and E. of Outer Spit buoy.

A *knoll* of 18 ft., loose shingle, and *another* of 22 ft., has lately (Nov. 1866) grown up at entrance of harbour channel. The W. edge of the 18 ft. is marked by a *black* can-*buoy* in 19 ft., with Southsea castle Lt.-ho. N. by E. ½ E., distant ½ m., and Spit Refuge buoy W. by N. ½ N., ⅙ m. The 22 ft. lies S.W. ¾ S. 1¼ cables from the above, and with the outer Swatchway beacon in line with Fitzclarence monument, N. ¾ E.

East Sand, with 5 to 10 ft. on it, sand and gravel, commences at the mouth of the harbour, and running parallel to Southsea beach terminates in a spit abreast the Swatchway beacons. Three *black can*-buoys, numbered 2, 3, & 4, mark its W. edge, and also the E. side of channel: No. 2 is the S. buoy, lying in 3½ fms.. and on it is a painted Notice, "*No vessel* to anchor in the Fairway."

The Bar, ¼ m. in extent N. and S., ½ cable wide, and steep-to on both sides, is a high gravel bank connecting E. edge of Elbow with outer spit of E. sand. There is 30 ft. over it at H.W., and 17½ ft. at L.W. sps.; and 27½ ft. at H.W. nps. Although the channel on the Bar is narrow, its limits are well-defined on entering by Nos. 2, 3, and 4 *black* buoys on starboard hand, and Nos. 1, 2, 3, 4, and 5 *chequered black* and *white* buoys on port hand.

DIRECTIONS.—The entrance to Portsmouth harbour, between Blockhouse fort on the west and Round tower on the east, is 750 ft. wide at H.W.

The harbour cannot be entered against the tide (at sps. it runs 4¼ kts. at entrance), except with a fresh fair wind or under steam. The best time is near slack tide about ½ an hour before H.W., or upon the slack between the 2nd and 3rd hours' flood. The flood is strongest between the 5th and 7th hours; the ebb between 3rd and 4th hours.

Steer in with Southsea castle Lt.-ho. N.N.E. ¼ E., and if of heavy draught pass S.E. of Outer Spit buoy. Vessels of proper draught may pass between it and the Spit Refuge buoy, as there is from 20 to 23 ft. there at L.W. springs. After passing about 1 cable E. of Spit Refuge buoy, steer in with outer Swatchway beacon in line with Fitzclarence monument, N. ¾ E., until the *red* beacon in W. angle of Blockhouse fort (appearing over a black patch with a white border on the wall below) comes on with the *black* beacon in Gosport fort, N.N.W. ¼ W.; with this mark on proceed over the bar between *chequered black* and *white* buoys to *port* and *black* buoys to *starboard*, until the H.W. mark of Blockhouse Pt. is on with the bakery chimney of Royal Clarence Victualling yard; steer on this mark, and when the Spur redoubt comes in line with King's bastion flagstaff, the course will be up the centre of the harbour.

To pass in *best water*, 8 or 9 ft. at L.W. sps., over Spit sand,—keep the spire of St. Judes ch. on with the E. end of high house (built of yellow and red bricks) standing at back of inner Swatchway beacon, until St. Thomas ch. comes on with W. angle of Spur redoubt; this latter mark leads in not less than 9 ft. till Bar mark comes on.

To pass through Swatchway in 7 ft. at L.W.—keep the Swatchway beacons (Outer beacon is *red*, Inner beacon is *black*, with a *vertical white* stripe down the centre of its upper part) on Southsea common in line, E. by N. ½ N., till the small white obelisk (on beach a little S. of baths) comes on with E. end of trees on Portsmouth lines, N.E. by N., easterly; this latter mark leads up to the Bar mark.

Bound in from the S.,—the Dockyard semaphore on with the Round tower will lead in 6 ft. at L.W., east of Hamilton bank, which extends ¾ m. from Haslar beach. Bound in from the W.,—the white house on Southsea common (near coastguard) in one with the Dock mill clears all shoal-water off Gilkicker Pt., and when the semaphore comes on with Round tower, proceed as before.

Round tower on with Gun-wharf clock, leads inshore of Hamilton bank in not less than 3 ft. at L.W.—a useful mark for small steamers.

Within the entrance, the harbour widens out, takes a N. by E. direction; the general width of channel is 2 cables, with irregular depths of 8 to 3 fms. At 1½ m. within the entrance, the harbour merges into Fareham and Porchester lakes, off which branch smaller lakes, bordered by mud banks, covered at H.W. Fareham lake gradually narrows, has 4½ to 3 fms. for ¾ m. to abreast Bomb Ketch and Spider lakes; at 1 m. farther there is only 1½ fms.: the lake then narrows and shoals, there being only 1 ft. at L.W. at ½ m. below Fareham, and 9 in. in channel abreast the town quay. Porchester lake has 5 to

3 fms., decreasing to 6 ft. just below Porchester castle. At sps. the tide begins to rise at Fareham bridge 4½ h. after L.W. at Portsmouth.

To take up a berth in the harbour on the flood, run well up past the thick of the shipping, and then turn the vessel's head upon the tide.

THE TIME BALL is hoisted halfway up the staff of semaphore in Portsmouth dockyard at 5 minutes before, and close up at 2 minutes before 1 p.m. every day, and is dropped at the *instant* of 1. p.m. Greenwich mean time. The semaphore is in lat. 50° 48′ 3″ N., long. 1° 5′ 58″·5 W. from Greenwich.

Tides.—The flowing into Portsmouth harbour continues 7 h., the ebbing 5 h. At 4½ h. after commencement of flood, or at 9½ h. F. & C., the W. stream has made inshore from Selsea Bill to Portland. So long as this W. stream maintains its strength through Spithead, the water is prevented from falling out of Portsmouth, and this check holds out till the Spithead stream slacks, when both Portsmouth harbour and Southampton Water rapidly empty themselves—the stream from Southampton beating back the W. stream at Spithead and converting it into an E. stream, which, near the Nab rock, unites with the Channel ebb, and runs with it round the S. side of Isle of Wight. (See pp. 56 and 93.)

At Spithead, between the Bramble and Horse, the E. stream makes at 2 h. F. & C., and runs 7 h. S.E. by S. The W. stream makes at 9 h., and runs 5 h. N.W. by N.

At the Horse Elbow, Dean Elbow, and Warner, the E. stream makes at 2 h., the W. stream at about 9 h. 30 m.

At the Nab rock, the streams are rotary, only a few minutes slack, caused by the Spithead tide meeting the tide round Dunnose. The E. stream makes at 4 h. 30 m., the W. stream at 11 h. The E. stream sets for 5 h. towards Bracklesham bay and entrance of Chichester, and therefore *great caution* is necessary in thick weather.

At the N.W. Princessa buoy the E. stream makes at 4 h., and sets E.N.E.; the W. stream at 10 h., and runs W. by S. ½ S.

At the S.E. buoy the tides are half an hour later. The E. stream runs E. by N. The first part of W. stream runs W. ¾ S., veering gradually to the S., the last part running S.W. by S.

PORTSMOUTH TO SELSEA BILL.

LANGSTON HARBOUR (as its Bar nearly dries at L.W.) will only admit vessels of light draught. A Fairway *conical* buoy marked L.F.W., and *striped black* and *white horizontally*, is moored in 1¾ fms. at L.W. sps., just within the Bar, and N.E 1½ cables from the shoalest part of the Bar, where the depth is only 6 ft. at H.W. sps. East and West Winner gravel banks, extending off both sides of the entrance, frequently shift, and in bad weather

have heavy rollers. Haslar hospital open of Southsea castle, N.W., leads S. of both banks in 9 ft. at L.W. The tide makes into the harbour at F. & C. at 5 h. and out at 12 h., and sets strong between entrance Pts. The best time for running in is at 1 h. before H.W.

The W. end of the officers' houses in Cumberland fort on with E. end of the large chalkpit on Portsdown hill, N. ¾ W., or the Fairway buoy in line with the Coast-guard flag-staff on Eastney Pt., leads over Langston bar. Pass close to the Fairway buoy, and directly the bar is crossed, steer between entrance Pts.

E. of the Dean Elbow buoy the water shoals gradually, and there will be no difficulty in keeping at a safe distance off shore according to the vessel's draught. **Hayling Knob,** a gravel bank of 8 ft. water, lies 1½ m. off shore, and from its shoalest part Sinah barn bears N. ¾ W., and Cackham tower is its own breadth open S. of Berry barn, E. by S. ¼ S. Cackham tower on with Berry barn, E. by S. ½ S., leads N. of the knob; Haslar hospital open of Southsea castle, N.W., leads S.

CHICHESTER HARBOUR should not be attempted without a pilot, as the entrance is difficult; the banks off it are constantly undergoing alteration; the bar has only 2 ft. on it at L.W. sps., and a shoal flat extends off 2 m. East Pole gravel banks dry 1½ m. outside E. entrance Pt., and their general direction being W.S.W., throws the entrance to the W., the reverse of Langston. West Pole bank runs out ¼ m. from W. entrance Pt. When there is any swell on outside, the sea breaks furiously over the banks, and even across the entrance, particularly with S. winds on the ebb.

About 1 m. outside the bar the streams are rotary and of little strength, turning to the E. at 4 h. 50 m. F. & C., and to the S.W. at 12 h. 45 m. They run strong between the Pts., and in the channel over the bar when the banks are uncovered.

The entrance bears N.E. ¼ E. 5 m. from Nab Lt.-vessel. To preserve an offing until a proper rise of tide, keep Haslar hospital open or just touching Southsea castle, N.W., which will ensure 3 fms. at L.W. In fine weather drop an anchor, as the ground is everywhere good. Cackham tower (a high brick ruin) on with Chichester spire, leads E. of East pole.

Entering from the S. or E., the Watch-ho. on E. Pt. of entrance in line with the plantation E. of Bow hill, N.E. by E. ¼ E., leads over bar and well into fairway (which will be known by the water deepening), when steer in mid-channel between entrance Pts.

Entering from the W., Cackham tower on with Berry barn, E. by S. ½ S., leads N. of Hayling knob, and over the bar in 17 ft. at H.W. sps.; but as this line points to the highest part of the East Pole, do not continue it longer than to have the fairway mark on.

MEDMERY BANK, gravel and broken shells, with 13 to 18 ft. over it, lies 2 m. W.S.W. of Medmery barn. *Clearing Marks*:—N.E. end of large chalkpit on Portsdown hill on with S.W. end of Hayling trees, N.N.W. ¼ W., leads in 4 fms. W. of the bank; the watch-house on E. side of entrance to

Chichester, N. by W. ¾ W., leads E.; and Bracklesham farm, in line with Bow hill, leads N.

Nelson monument, over W. end of Hayling trees, leads 1 m. outside **Hounds** rocks, which are joined to the coast, and uncover more than ½ m. off shore at L.W. sps.

BULLOCK PATCH, rocky, of 28 ft. water, lies S.E. by E. ¾ E. 3¼ m. from Nab Lts. *Clearing Marks*:—Asheydown tower on with Bembridge ch. spire, W. by N. ½ N., leads close to S. edge; but should the *black* buoy lying in 7 fms. at ¼ m. S.W. of this patch be gone, stand no nearer in a large ship than to have Nab Lt.-vessel on with Nettlestone Pt., N.W. by W., or Asheydown tower on with Bembridge mill, W.N.W., until E. end of large chalkpit on Portsdown hill comes on with E. end of Cumberland fort, N. by W., which will lead to the W.

OWERS TO BEACHY HEAD.

VARIATION, 19° 45′ TO 19° W.

ASPECT of COAST.—The coast from Chichester to Selsea Bill is a low earthy bank, and should not be approached within ½ m., as the water shoals suddenly from 4 to 2 fms. Selsea Bill, when above the horizon, makes as a remarkably sharp low Pt. when seen E. or W.

From Selsea to Pagham the shore is a low shingle beach, and flats extend off 2 m., at which distance there is less than 3 fms. There is no landing at L.W. except near Selsea Bill. Pagham harbour, being choked by shifting banks, is useless.

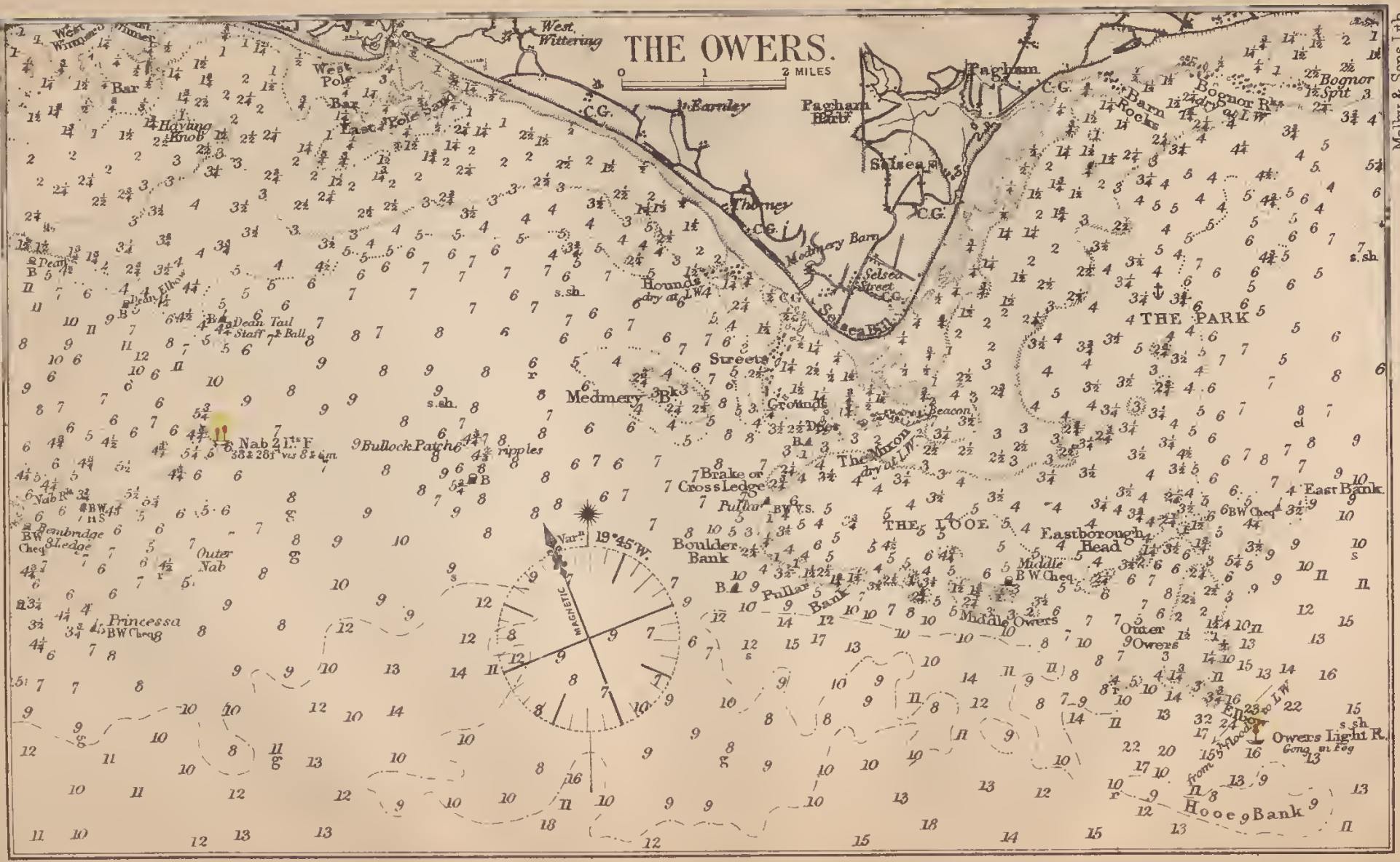
From Pagham to Brighton the coast is a low earthy bank with a flat country at the back of it. From Brighton to Newhaven it is composed of chalk cliffs 30 to 170 feet high, the summits clothed with verdure; Burrow Hd., the eastern-most cliff, 190 ft. high, with a fort on it, has a rusty appearance, and close to its E. side is Newhaven harbour.

From Newhaven to Seaford Hd. the shore is a low beach; on the W. part of the beach is Catt's tide-mill (a large yellow building with a white windmill on it), and near the E. part of the beach is Seaford, conspicuous by its square tower ch., also by the spire of Blatchington ch., a little farther inland, and by the martello-tower on the beach near the low N.W. part of Seaford Hd.

Seaford Hd., 270 ft. high, is of a rusty white appearance, with a large green patch on its face near the top, by which it may be known from Beachy Hd., 550 ft. high, which has a clean white face, and a house on summit. Between these headlands is a range of undulating white cliffs, called the Seven Sisters, which render Beachy Hd. remarkable when seen from the W.

LANDMARKS.—Berry barn is large, close to the coast, and the second building E. of Chichester harbour. West Wittering ch. (a spire) stands a short distance inland. Cackham tower is a high brick ruin, ¼ m. E. of Berry

Plate 10



Malby & Sons, Lith.

barn. Selsea ch. is on W. side of entrance of Pagham harbour, and Pagham ch. on E. side; the latter has the tallest spire.

Felpham white mill stands close to the edge of the coast, ½ m. E. of Bognor; Felpham ch. is ½ m. at back of the mill, and having no spire will be known from Bersted ch. at ½ m. W. of it. Middleton ch. has a spire. Climping mill is large and black. Preston ch. spire shows above the trees. Highdown hill has on its face three small chalkpits, and a black mill on the W. slope. Goring ch. has a black spire. At 5 m. N.N.E. of Worthing is Chanctonbury ring, a large, circular, thick grove of trees, 780 ft. above the sea. Navarino two mills (black) are close together, on shore at ½ m. E. of Worthing. Lancing mill is white. Near Shoreham is a high coke chimney.

The OWERS comprise the foul ground and dangerous rocky ledges, 6½ m. long S.E. by E. and N.W. by W., fronting and extending 5¾ m. S.S.E. of Selsea Bill, at which distance the elbow of Outer Owers breaks down *suddenly* from 3¾ to 30 fms. These dangers are, however, easily avoided by the Lt.-vessel being moored in 19 fms. at ½ m. S.S.E. from the Elbow. She has one mast, a red ball at masthead, and exhibits a *revolving Lt.*, showing *white* and *red flashes* at intervals of *half a minute*, in the order of *two white* and *one red*.

The following are the principal dangers:—

Dries is the extreme of ledges running S.W. nearly 1½ m. from Selsea Bill, where a *black* buoy (conical and marked Street) lies in 2 fms.

Mixon is the E. and highest part of a mass of rocks, 1 m. E.S.E. of Dries. It covers at ¼ flood, but there is an *iron pillar* with a *cage*, 30 ft. above H.W. sps., on its highest part, close to the E. end.

Cross Ledge runs S.W. by W. from the Dries, to which it is joined, and forms a rocky bar, with 10 to 25 ft. over it, to the W. entrance of the Looe.

Boulder Bank, gravel, large stones, and rocks, extends ¾ m. S.W. from the Cross ledge, and off its outer end, at 3¼ m. off shore, is a *black conical buoy*. Its shoalest part, 2 ft., is near its S. end, and there is as little as 8 ft. at its N. end, a boat's length S. of the Pullar buoy. This buoy (conical, with *staff* and *cage*), with *black* and *white vertical stripes*, lies in 2 fms., and marks the S. boundary of W. entrance to the Looe.

Pullar Bank and **Middle Owers.**—From S.W. end of the Boulder, the shoal suddenly bends, and runs S.E. by E. 3½ m.; the W. part is called Pullar, the E. part Middle Owers. The Pullar is a succession of high hds. of gravel and rock, of 6 to 10 ft. water, having two narrow channels between them of 3½ to 4 fms., which are useful to small vessels. Mixon beacon on with the first clump of trees E. of Pagham ch., N.E. ¾ N., leads through the W. channel in 20 ft. Mixon beacon on with Chichester spire, N. by E. ½ E., leads through the E. channel in 19 ft.

Middle Owers, of large blocks of stones and coarse gravel, has one dangerous hd., which nearly dries at L.W.; just abreast this head is a *chequered black* and *white* (can) buoy in 5 fms. water, 250 yds. inside the shoal. Selsea coast-guard on with E. end of plantation W. of Bow hill, N. ¼ E., leads to the buoy, and scrapes the E. side of the dangerous hd.

Swatchway, between Middle and Outer Owers, has 6 to 8 fms. water, but as there are patches of 2¾ fms. in the Looe and in the Park, large ships using it must watch the rise of tide.

Bound in from the S.E.,—Mixon beacon on with Street coast-guard, N.N.W., leads in clear of the W. face of Outer Owers.

Bound in from the S.,—Selsea Corner on with the white roadway on Bow hill, N. ¼ E., leads in mid-channel.

Bound in from the W.,—Kinnaird ho. on with Clarence Hotel, Bognor, N.E. ¾ N., leads clear of E. end of Middle Owers, to anchorage in the Park.

Outer Owers is the outer and most dangerous of the numerous shoals off Selsea Bill, and its off-lying position, combined with strong tides and heavy seas during S. gales, renders it the most dangerous shoal in the English Channel. Its extent, from the inner edge of Eastborough Hd. to the Outer prong of Elbow, is 2 m. long, N. by E. and S. by W., and ¾ m. wide. There is not more than 6 to 12 ft. over the greater part, but the **Shoal of the Lead** has only 2 ft. on it, from which Chichester spire appears halfway between Pagham ch. and a remarkable single tree (a short distance E. of ch.), N., and the large chalkpit on Portsdown hill is its breadth open S. of Mixon beacon, N.W. by N. No marks can be given for the **Elbow**, but use great caution in approaching it, as there are 30 fms. within 100 yards of its extreme.

There is no safe passage between the N. end of Outer Owers and **Eastborough Hd.**, which has rocky patches of 6 ft. water.

East Bank, gravel and sand, has a *chequered black* and *white* (conical) buoy with *staff* and *cage* in 4½ fms., a short distance E. of its shoalest part of 19 ft.; but as there are only 21 ft. at ¼ m. outside the buoy, to pass eastward keep Chichester spire on with the W. end of plantation on Bow hill, N. by W., or Bersted ch. spire on with E. end of Goodwood, N. by E.

Pagham watch-ho. on with Chichester spire, bearing N. ¼ W., leads in a *good channel* of 26 ft. water between the East bank and Eastborough Hd.; but large ships had better pass ⅓ of a mile E. of the buoy.

Hooe Bank.—Fronting the Owers shoals is an extensive rocky flat of 7 to 9½ fms., which abreast the Boulder runs off S.S.W. 3 m. To the E. this flat narrows and forms the Hooe bank (which is a sort of tail to the main body), of 8 fms. water, 3 m. long E.S.E. and W.S.W., ¼ m. broad, its outer part being 1½ m. from the Elbow.

This extensive flat of 7 to 9½ fms. presents, by a close attention to the soundings, a valuable warning of approach to the Owers, there being 12 to 17 fms. between it and the Pullar bank and Middle Owers, and 13 to 30 fms. between the Hooe bank and the Elbow. The Hooe clearly shows itself by overfalls, which in bad weather occasion a heavy broken sea during a weather tide.

LOOE STREAM, having in many parts not more than 16 ft. at L.W., and its W. entrance barred by turbulent overfalls, can only be used safely by small vessels, or by those locally acquainted. Take care not to attempt it without a fair strong breeze and plenty of time to get through before dark.

Approaching from the W.,—as the Cross ledge is neared, do not bring Mixon beacon N. of Dries buoy. Pass southward of this buoy, but give it a berth, as there is only 11 ft. at ¼ m. S. of it: the nearer the Pullar buoy (see p. 116) the better, but *always* pass N. of it. If the Isle of Wight is tolerably clear, Little See-me-not just showing S. of Culver cliff, W. by N., leads over the Cross ledge and the whole way through the Looe in 14 ft. least water. The Pullar buoy on with the Culver cliff, W. by N., will also lead through.

When Mixon beacon bears N. or N. by W., if bound for the **Park** steer eastward, and anchor, if in a large ship, in 6 fms., with Mixon beacon W. by N., and Chichester spire showing W. of Bow hill, excellent holding-ground of stiff clay; or, if in a small vessel, in 3 fms., with Mixon beacon W.S.W., and Pagham watch-ho. on with Chichester spire. The Park is well sheltered from W. and S.W. winds, but most unsafe with anything east of S.

Working through the Looe,—in standing S. do not bring the Middle buoy E. of S.E. by E.; in standing N. between the Mixon and the Dries, do not bring that buoy W. of N.W.; and in shooting over the Cross ledge pass near the Pullar buoy. When E. of Mixon beacon, by not standing farther N. than to have the beacon bearing W., will ensure 15 ft. at L.W.

DIRECTIONS.—A bearing of the Owers Lt.-vessel will be a good guide, either for passing S. of these dangers, or for avoiding them when turning to windward. A vessel will be W. of the Boulder bank when Medmery barn is on with Chichester spire, N.N.E. ¾ E.; abreast of the Middle Owers when Pagham ch. is on with Rooks hill, N.N.E.; and E. of Hooe bank, Outer Owers, and East bank when Bersted ch. is on with Goodwood, N. by E. In clear weather the red clay cliff (Isle of Wight) opens S. of Culver cliff, N.W. by W. ¾ W., leads 1½ m. S. of Pullar bank, and ¾ m. S. of Outer Owers.

AT NIGHT.—If bound E. from Spithead—the Nab and Warner Lts. *kept* in line N.W. ½ N., lead about 1½ m. S.W. of Boulder buoy, and 3 m. S.W. of Owers Lt., but recollect that both flood and ebb streams set *obliquely* across the vessel's course. When Owers Lt. is seen, shape a course to pass any convenient distance S. of it, but do not bring it S. of S.E. by E. ½ E. (See p. 3.)

If bound W. from Beachy Hd.,—between Beachy Hd. and Littlehampton do not stand into less than 10 fms., and in approaching the Owers do not bring Owers Lt. S. of S.W.; after passing S. of the Lt. do not bring it S. of S.E. by E. ½ E. to clear the shoals,—but this is a *close* mark for a large ship, and she should not shoal to less than 10 fms., to ensure being S. of Hooe bank, until Nab Lts. are seen, when there will be no danger if they are not brought W. of N.W. (see p. 5.)

Standing towards the Owers, the first deep water cast *after crossing* the Hooe bank, will be a warning of approach to those dangers. Failing to get a deep-water cast (say 9½ or 10 fms. at L.W.), the vessel will be W. of Boulder bank, and must take care not to get embayed by standing in too far.

Between the Owers and Dunnose, by not shoaling to less than 10 fms. at L.W., will clear all danger, so long as Nab Lts. are N. of N.N.E.; after losing sight of which keep St. Catherine Lt. in sight.

In *thick weather* do not shoal towards the Owers to less than 20 fms.

At W. entrance of the Looe, the E. stream, F. & C., makes at 3h. 45 m., the W. stream at 10 h., and they set S.E. and N.W. At E. entrance, the E. stream makes at 4 h. 30 m., and sets E. by N. ½ N., the W. stream at 9 h. 50 m., and sets W. At 2½ m. outside the Boulder bank they turn an hour later, and set E. S. E. and W.

Off W. end of Hooe bank, the E. stream makes at 4 h. 35 m., and sets E.S.E.; the W. stream at 10 h. 30 m., and sets W. ¾ N.

BOGNOR ROCKS, a dangerous ledge extending S.E. 1¾ m. off shore on the W. side of Bognor, are bold on their sea-face, and dry before L.W. Their outer end, Bognor spit, is 1 m. off shore, dries at 5 h. ebb, and has 13 to 17 ft. on its N.E. side. From its extreme end Pagham ch. is on with the Watch-ho., N.W. by W. ¾ W., and Felpham ch. is open E. of the two mills.

Clearing Marks:—Pagham watch-ho. open N. of Pagham ch., N.W. by W. ¼ W., leads ¼ m. S. of the ledge. Felpham white mill on with the grove E. of Rooks hill, bearing N., leads E. of the spit. Middleton ch. spire on with Arundel ch. turret (white), leads S.E. of the spit.

Anchorage on N.E. side of Bognor rocks is used by small coasters, but take care not to be caught here with S.E. winds, which throw in a heavy sea. Felpham square black mill just open W. of circular white mill, N. by W. ½ W. leads in 3 fms. W. of Shelly rocks. These two mills on with Rooks hill, N. ¾ W., leads in fairway between Shelly rocks and Bognor spit.

After rounding Bognor spit, steer for the shore W. of Felpham white mill, and anchor when Pagham ch. opens N. of coastguard.

DANGERS BETWEEN BOGNOR AND SHOREHAM.—Middleton ledge projects a short distance outside L.W. mark at sps. between Felpham mills and Middleton ch. Between its outer end (with 4 to 6 ft. water on it) and the Shelly and Winter rocks, no vessel drawing more than 9 ft. should go at L.W.

Shelly Rocks are patches of 4 to 6 ft. water, 1¾ m. S.S.E. of Felpham mills. *Marks* for S.E. patch:—Middleton ch. on with the E. end of a conspicuous long barn, N.N.E. ¼ E.; and the middle chalkpit on Highdown hill on with the left of the two Rustington mills.

A *black* (conical) buoy lies in 4 fms. on the E. side of the Shelly rocks, with the above marks nearly on.

Winter Knoll is a small chalk bank of 8 ft. water, 2½ m. S.W. by W. of Littlehampton Lt.-ho. *Marks* for 8ft.:—Arundel ch. is on the middle of eastern of two gaps in park trees, N.E. by N.; and Cisebury hill is over the top of Highdown hill, E. by N. ¼ N.

A *black* (can) buoy lies in 18 ft., on the S. side of the knoll, 1¾ m. E. by S., southerly from the Shelly buoy. Salvington mill on with the chalkpit on Highdown hill, E. by N. ½ N., leads S. of the knoll.

Kingmere Rocks, of 4¾ to 5½ fms. water, cover a narrow space 2 m. long N.W. by W. and S.E. by E. They lie 4½ m. off shore, S.S.W. from Preston

ch., and between them and the flats extending off shore are 5½ and 6 fms., with occasional patches of 3¾ fms.

Goring ch. N.E., leads over the W. end of these rocks in 29 ft. Navarino mills seen between Lancing grove and Lancing mill, N.E. by E., leads over the E. end in 33 ft. Chichester spire over the N. part of Felpham trees, N.W. ½ N., leads over the N.W. part in 29 ft. and S. of E. end of 7½ fms.

Grass Banks, with only 9 ft. on them at 1½ m. off shore, extend along the shore off Worthing. The Elbow, their most projecting part, bears S.S.E. from Navarino mills, and S.S.W. from Lancing grove; their E. side terminates 1 m. W. of the black coast-guard at Shorcham. Portslade mill on with Shoreham low Lt.-ho., leads outside the Elbow in 12 ft. at L.W.

Church Rocks, of 3 ft. water, are ⅓ m. off shore, ½ m. W. of the black coast-guard at Shoreham. *Marks*:—The cement chimney on with the roof of Shoreham ch.; and Lancing mill over the two E. groynes on the beach.

Fishers-gate mill (circular and gray) just open of Shoreham piers, E. ½ S., leads S. of the rocks in 14 ft.

JENNY GROUND, a cluster of chalk rocks of 5 to 7 ft. water, extends ½ m. off shore abreast Copperas (white square) mill, which stands on the low cliffs near E. arm of Shoreham harbour. *Marks* for outer part of 7 ft. water:—Copperas mill on with Portslade (white square) mill, N.N.E.; and Shoreham ch. shut over the piers.

Shoreham ch. on with Lancing grove, and open S. of white pier-hds., N.W., leads S. of Jenny Ground.

LITTLEHAMPTON.—The entrance to the Arun river is between two piers 125 ft. apart, N.W. by W. ½ W., 29 m. from Beachy Hd. Lt.—The W. pier extends 2 cables farther out than the E. pier. In continuation of the E. pier is a low dicker-work, carried out to L.W. mark. A row of warping-posts are driven into the sand 20 ft. E. of the dicker-work; the outer 3 posts are off the end of the low work, the termination of which on the E. side is marked by a bush beacon. Littlehampton is ¾ m. within the entrance.

There is 16 to 17 ft. on the *bar* and between the piers at H.W. sps., and 11 to 13 ft. at nps., and from thence 18 ft. to 16 ft. up to Littlehampton. A vessel drawing 14 ft. can proceed up to Arundel. Sps. rise 16 ft., nps. 11½ ft.

There is no dry-dock, but a good patent slip and large gridiron. The slip will take a vessel of 260 tons and 6 to 7 ft. draught. Ballast can be had in plenty. Vessels do not lie afloat at L.W. alongside the different piles and quays, but the berths are all good and safe.

If drawing less than 10 ft. there is good anchorage in the 2 fms. hole outside the entrance, with the outer warping-post on with the mill near the harbour, N. ¾ E., and Cisebury hill opening S. of crest of Highdown hill; or in 13 ft. chalk and gravel, at 1 m. from the piers, with Salvington mill on with the chalkpit on Highdown.

If drawing 17ft., anchor with the entrance open and 1½ m. distant in 20 ft., chalk, stones, and gravel, with the Lt.-ho. bearing North. (The pilots

prefer anchoring vessels of 17 ft. draught 2 cables farther W., with the entrance shut in).* With E. winds anchor off Rustington mills, as the W. stream makes by the time there is water to enter.

DIRECTIONS.—The Tide Signals for entering (the same as at Shoreham, p. 73) are made from a white mast at N. end of E. pier, and denote the depth in feet at entrance. A torchlight is shown when the harbour, from any cause whatever (other than want of water) is inaccessible. Guard against the tide, for close outside the E. pier-hd. it sets strong (2½ kts. at sps.) to the W., from ½ flood to ½ ebb, and strong (5½ kts.) up the harbour between the piers until 1 hour after H.W.

At night a fixed red Lt., 30 ft. above H.W., is shown *all night* on N. end of E. pier.

The following perpendicular Lts. are exhibited on the S. end of E. pier to show the depth of water, and when in one with the *above* red Lt., bearing N., lead to the entrance:—A white Lt. indicates 10 ft. between piers; *green* Lt., 11 ft.; *red* Lt., 12 ft.; *red* and *white* Lts. (vertical), 13 ft.; *two white* Lts. (vertical), 14 ft.; *white* and *green* Lts. (vertical), 15 ft. These Lts. are extinguished at H.W.

WORTHING PIER, 15 ft. wide, runs off 960 ft. from the promenade. The bottom dries 50 yds. outside the pier end at L.W. sps., and there is only about 3 ft. there at L.W. nps. Sps. rise 16 ft., nps. 11½ ft. At night the pier end is marked by a *fixed* (gas) Lt., which shows *green* seaward, and *red* E. and W.

SHOREHAM HARBOUR, being about midway upon the exposed coast between the Isle of Wight and the Downs, offers great facilities for windbound vessels to run for and shelter in, and is capable of taking vessels of large burden at all tides at H.W., the entrance being wide, with a depth of 20½ ft. between the piers and in the harbour at H.W. sps., and 15 ft. at H.W. nps. Sps. rise 18 ft., nps. 13¼ ft., and nps. range 9 ft. The entrance is between two piers, 176 ft. apart. Within these a middle pier is built out from the shore to direct the ebb stream to the entrance, and it divides the harbour into two parts, called E. and W. Arms.

The W. arm has 20½ ft. in it at H.W. sps., 15 ft. at H.W. nps., and vessels drawing 7 ft. can lie afloat at L.W. sps.

In the E. arm there is a floating canal about 1½ m. long, with an entrance lock 175 ft. long between the gates, and 33 ft. wide; and at the E. end of the canal there is a basin and wharf, where vessels can discharge free of wharfage dues. The depth in the canal is 16½ ft. at H.W. sps., and 12 ft. at H.W. nps.; but vessels not drawing over 15 ft. can lie afloat at all tides inside the lock-gates. The depth over the sill of the lock is 21½ ft. at H.W. sps., and 16 ft. at H.W. nps., but there is not so much water from the lock to the middle pier-head by about 3 ft. The patent slip in the W. Arm will receive a vessel of 600 to 700 tons; and the slip in the E. arm one of 300 tons.†

* Additions to 1874 by Mr. C. S. Dunbar, Harbour Master.
† Additions to 1874 by Mr. S. Sanders, Harbour Master.

Waiting for water to enter the harbour, anchor in 3½ fms. off the black coastguard, with Shoreham ch. bearing N., and Portslade mill between the low Lt.-ho. and pier-hds., sheltered from the W. by the shallows off Worthing. There is anchorage from ⅛ m. off the harbour in 16 ft., to 1 m. in 24 ft., sand, gravel, and chalk: and also W. of the Jenny Ground in 3 fms., sand, shells, and mud, with Shoreham ch. on with Lancing grove.

TIDE SIGNALS.—Two Lt.-houses, 250 yds. apart, N.N.E. and S.S.W., are within the entrance of Shoreham. The High Lt.-ho., of gray stone, 38 ft. high, stands on the shore abreast the piers, and shows a *white* Lt. all night. The Low Lt.-ho., of wood and painted white, stands on the apex of middle pier, and also shows a *white* Lt. during the time a vessel drawing 11 ft. can enter with safety, and a *red* shade is put over at H.W. slack.

On Low Lt.-ho. is a small flagstaff, on which a *red* flag is hoisted by day when 11 ft. draught can enter with safety, and at H.W. slack it is hauled half-staff down.

Near Low Lt.-ho., on middle pier, is a flagstaff and yard, on which the following signals* are made, with *black balls*, and a *blue* and *white pendant*:—

Signals.	Signification.
Signal ball at masthead	General answer or acknowledgment.
Two balls ,,	8 ft. water on bar with flowing tide.
Three balls ,,	9 ,, ,, ,,
One ball at outer yardarm	10 ,, ,, ,,
Two balls ,, ,,	11 ,, ,, ,,
Three balls ,, ,,	12 ,, ,, ,,
One ball at inner yardarm	13 ,, ,, ,,
Two balls ,, ,,	14 ,, ,, ,,
Three balls ,, ,,	15 ,, ,, ,,
Single ball at each yardarm	16 ,, ,, ,,
Pendant at masthead	Slack tide.
,, and one ball under at masthead.	16 ft. on bar with an ebbing tide.
,, and two balls under at masthead.	15 ,, ,, ,,
,, at masthead, and one ball at outer yard-arm.	14 ,, ,, ,,
,, and two balls at ditto	13 ,, ,, ,,
,, and three balls at ditto	12 ,, ,, ,,
,, and one ball at inner yard-arm.	11 ,, ,, ,,
,, and two balls at ditto	10 ,, ,, ,,
,, and three balls at ditto	9 ,, ,, ,,
,, at outer yard-arm	8 ,, ,, ,,
,, and one ball under at outer yard-arm.	Not water enough on bar.
,, and two balls under at ditto	Keep eastward.
,, between two balls at ditto	Keep westward.
,, under one ball at ditto	Signal cannot be made out—the flag is foul or hid by upper sails.
,, under two balls at ditto	Depth of water will be shown at every foot rise or fall.
,, at inner yard-arm	Assistance will be sent immediately.

* The same signals are used at Littlehampton.

Signals.	Signification.
Pendant with one ball under at ditto	Pilots cannot get to sea.
,, with two balls under at ditto.	Pilots will be sent when a boat can pass the bar.
One ball with pendant under, at inner yard-arm.	Pilots are all engaged, but one will be sent as soon as possible.
Two balls ditto ditto –	Owner wishes his vessel to bear up for shelter.
,, at outer and one ball at inner yard-arm.	Owner does not wish his vessel to risk the bar.
One ball at outer, and two balls at inner yard arm.	Pilots will be on the pier; if the vessel attempt the bar the depth of water will be shown.
Two balls at masthead, and one ball at outer yard-arm.	A vessel might stem the tide.
Ditto ditto inner yard-arm –	Tide runs so strong that a vessel may not be able to stem the tide.
One ball at masthead, with pendant under.	Tide is ebbing.
Two balls ditto ditto –	Tide is flowing.

DIRECTIONS.—Approaching from the E., keep Shoreham ch. (square tower) open S. of pier-hds., N.W., to avoid the Jenny Ground. At night do not shoal to less than 5 fms. at L.W., till the high Lt. is N.N.W.

The stream on both tides runs strong (often 6 kts. at springs) between the piers; on the flood it is split by the middle pier, and it slackens in each Arm. The best time, therefore, to enter is at H.W. slack. The two Lt.-houses in one, N.N.E., leads between the outer pier-hds., but always allow for the stream setting strong to the W. past the pier-hds. for 2 hrs. before H.W. on the shore. When inside the pier-hds., borrow towards the Arm the vessel is bound to, to avoid the strong set against the middle pier.

BRIGHTON PIERS.—The E. or old chain-pier extends 1100 ft. outside H.W., and 580 ft. outside L.W. mark. There is 4 ft. at L.W., and 23 ft. at H.W. sps., at the pier-end, which is marked by a *fixed green* Lt.

The W. or new pier is of iron, erected on screw-piles, screwed 10 ft. into the chalk rock, at 1 m. W. of old pier. It runs off 1130 ft. from the promenade; its abutment is 300 ft. long by 100 ft. wide; its main body 560 ft. by 45 ft.; and the pier-hd. 270 ft. by 120 ft. There is 10 ft. at L.W. and 29 ft. at H.W. sps., at pier-hd, which is marked by a fixed *red* Lt.

Beachy Hd. Lt. open of Seaford cliff leads in 3 fms. outside the shallows off the E. part of Brighton. The Lt. just open and shut of the cliff leads in 8 to 14 ft. outside all patches of chalk rocks scattered along the shore between Brighton and Newhaven; if kept a quarter of a point open it is a good working mark, but *the best guide* is the lead. In thick weather do not shoal towards the piers to less than 5 fms. at L.W. The stream in-shore sets to the W. 2 hrs. before H.W.

NEWHAVEN HARBOUR is at the entrance of the river Ouse, in the N.W. extreme of Seaford bay, close to the E. of Burrow Hd., which is the last of the range (p. 66) of chalk cliffs E. of Brighton. The piers, 150 ft. apart at entrance, run out in a S. direction across the beach. On the E. side of the harbour there is a good wharf, and on the W. side berthing-piles, alongside which vessels lie aground on soft mud. The river is navigable up to Lewes

for small coal-brigs. The gridiron in the harbour will take a vessel of 600 tons and 200 ft. long.*

At 150 ft. W. of the W. pier, a groyne, built of piles and stones, runs off S.S.W.. 600 ft. Since its erection the shingle bar, which was formerly awash at L.W. sps. outside the entrance, has quite disappeared, and there is now 4 ft. there at L.W. sps., and 6 to 8 ft. at L.W. nps.; occasionally the 8-ft. ball continues up all the tide at nps. In the harbour there is 20 to 22½ ft. at H.W. sps., and 14 to 17 at H.W. nps. Sps. rise 20 ft., nps. 15 ft., and nps. range 10 ft.

Tide signals are made from the flagstaff on W. pier by day, and by Lts. on middle of W. pier, 130 ft. within entrance, at night; but in entering allow for the scend of the sea. For 8 to 10 ft. at entrance *one* black ball is hoisted; 10 to 13 ft., *two* black balls. At 13 ft. balls are lowered, and *red* flag is hoisted and kept up when upwards of 13 ft., and until the tide has ebbed to 13 ft. From 13 to 10 ft. *two* balls are hoisted; from 10 to 8 ft., *one* ball.

Two *fixed* Lts. (30 and 17 ft. above H.W.), N. ¼ W. and S. ¼ E. of each other, and 50 yds. apart, are shown from the W. pier. High Lt. is *white*, and shown all night. Low Lt. is *red*, when 10 to 13 ft. at entrance; *white*, above 13 ft. till tide ebbs to 13 ft.; *red*, from 13 to 10 ft. A *green* Lt. is shown all night from Lt.-ho on middle of E. pier, *abreast* Lt.-houses on W. pier.

DIRECTIONS.—Approaching Newhaven from Beachy-Hd.—if the rocks off Crowlink are covered there will be 10 ft. and upwards at the entrance. When nearing the piers, bring them to bear N., with the harbour open, and steer in.

At *night* the Lts. in one, N. ¼ W., lead in. The gas Lts. at Brighton greatly assist vessels making the harbour at night. The tide is weak across the entrance, but runs 2½ kts. between the piers.

SEAFORD ROAD.—The depths between Shoreham and Beachy Hd. decrease gradually towards the land, and vessels with off-shore winds can anchor anywhere in 9 to 3 fms. If Seaford road is used, anchor between the martello tower and Blatchington battery in 7 fms., sand, shells, and mud, with Beachy Hd. Lt.-ho. just shut in by the cliffs, sheltered by Beachy Hd. with the wind as far south as E.S.E.

Straggling chalk rocks of 2 to 4 ft. water lie ¼ m. off the low N.W. end of Seaford Hd. Newhaven mill on with the pier-hds., or Crowlink coastguard open of the S.E. cliff of Seaford Hd., leads S. of them in 3½ fms.

BEACHY HEAD TO SOUTH FORELAND.

VARIATION, 19° TO 18° 40′ W.

BEACHY HEAD (E. by S. southerly, 35 m. from Owers Lt.) is remarkable when seen from the W. by the uniform convexity in the profile of its white cliffs. The white Lt.-ho., 47 ft. high, standing on a spot 242 ft. above

* Additions to 1874 by Mr Z. Stevens, Harbour Master.

H.W., called Belle Toute, near the summit of the 2nd cliff W. of the Hd., shows a *white* Lt., which *revolves* once in every *two minutes:* its brilliancy is of 15 seconds' duration, and its darkness 1 m. 45 s.

Approaching Beachy Hd. from the E., or after rounding it from the W., keep the Lt. or Lt.-ho open of the Hd., N.W. ¾ W., and it will lead 2½ m. S. of the Royal Sovereign buoy, and 1 m. S. of the Southern Hd. of the Royal Sovereign shoals.

The low shore from Beachy Hd. towards Pevensey is studded with martello towers; towards Hastings it rises, and the land appears double. Fairlight down, the highest land hereabouts, has a mill,* and a ch. with a square tower, on it.

ROYAL SOVEREIGN SHOALS are rocky banks lying in the track between Beachy Hd. and Dungeness. The following are the principal:—

Royal Sovereign, of sandstone rocks, has a patch of only 9 ft. water. *Marks* for the 9 ft.:—Signal-ho. on Beachy Hd., W. by N. ½ N., 6½ m.; 1st tower E. of the Grand redoubt at Eastbourne on with the W. edge of Willingdon chalk-pit, N.W.; Fairlight mill just opening of Hastings castle cliff, N.E. by E. ½ E. A large Bell buoy (with staff and cage), *striped black* and *white vertically*, lies ½ a cable S. of the 9 ft. patch.

Southern Head is a narrow ridge ⅓ m. long N.N.E. and S.S.W., of 25 ft. water, lying S. ½ W. 1 m. from the Royal Sovereign. *Marks* for the 25 ft.:—Beachy Hd. signal-ho., N.W. by W. ½ W. 7 m.; Hankham mill on with the 8th tower E. of Eastbourne, or the 4th from Langley fort, N. by W. ½ W.

Close to the S. edge of this ridge is 8 fms. water, to the E. 11 fms., between it and the Royal Sovereign 5 to 10 fms. There is 10 fms. at ½ m. S. of the ridge, and at 1 m. S. of the ridge Beachy Hd. Lt. will open out N.W. ¾ W.

Horse of Willingdon, stone and rock, is 2 m. N.W. by W. from Royal Sovereign buoy. *Marks* for shoalest spot of 18 ft.—Hankham mill just W. of 3rd tower from Langley fort, or 7th from Eastbourne, N. ½ W.; Beachy Hd. signal-ho., W. by N. ¼ N. 4¾ m. There are strong ripplings over this shoal.

Elphick Tree, a small shoal patch of 30 ft., lies ¾ m. N.W. of the shoalest part of the Horse of Willingdon. Between it and the shore, 1½ m. from Langley fort, is a small rocky spot of 4 fms.

Long Shoal is a narrow bank a mile long, of 18 to 25 ft. water, lying ½ m. N. of the Royal Sovereign.—**Kinsmans Nab,** a smaller patch of 22 ft., nearly joins its W. edge.

DIRECTIONS.—Rounding Beachy Hd. from the W.,—Seaford cliff kept *just* in sight of the pitch of Beachy Hd., N.W. ½ W., leads 2 m. S. of Southern Hd. When the two high white mills at Battle come on with Bexhill, N.N.E., or the Royal Sovereign buoy bears N., the vessel will be E. of Royal Sovereign shoals, and may haul up E. by N. for Dungeness. As the soundings decrease

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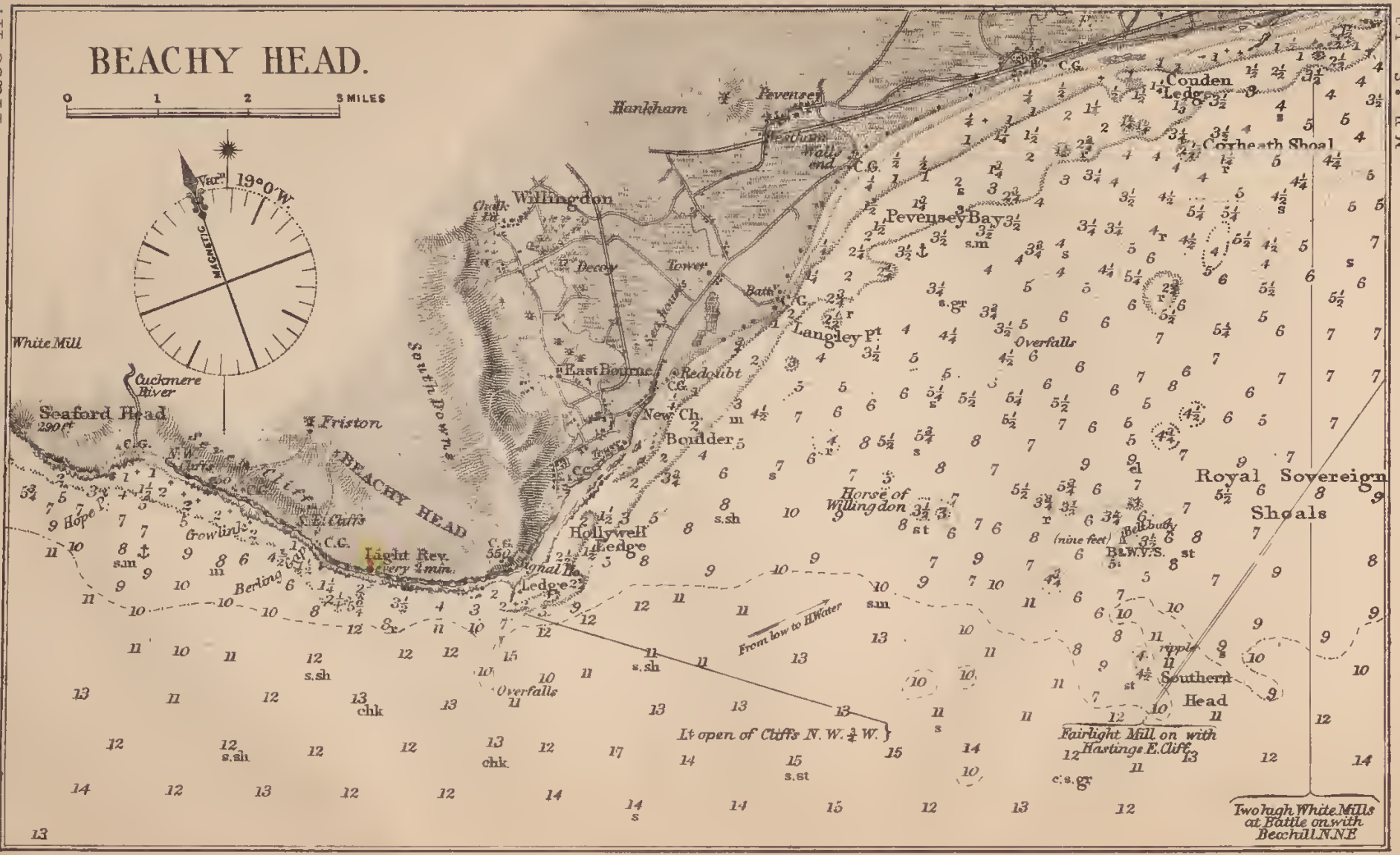
* Fairlight mill was taken down in 1871, and has not yet been rebuilt. October, 1873.

Plate 11.


BEACHY HEAD.
0 1 2 3 MILES
Vert. 19° 0' W.
MAGNETIC
White Mill
Cuckmere River
Seaford Head
290 ft
Friston
BEACHY HEAD
South Downs
Hankham
Pevensey
Westham
Walls end
Willingdon
Decoy
Tower
Batt.
East Bourne
Redoubt
New Ch.
Boulder
Hollywell Ledge
Signal Ho.
Ledge
Light Rev.
Every 2 min.
Hope P.
Crowlink
Berling
Overfalls
Langley Pt.
Pevensey Bay
Couden Ledge
Coxheath Shoal
Horse of Willingdon
(nine feet)
Belt buoy
B.&W.V.S.
Royal Sovereign Shoals
Southern Head
From low to H.Water
Lt open of Cliffs N.W. ¾ W.
Fairlight Mill on with Hastings E. Cliff
Two high White Mills at Battle on with Beechill N.N.E.
Malby & Sons, Lith.

regularly towards the land between Beachy Hd. and Dungeness, the lead will be a good guide in thick weather (see pp. 3 and 5).

At *night*—the best plan to adopt is to pass Beachy Hd. close enough to take a good departure (see foot-note p. 4). Run to the E., with the Lt. just open of the pitch of the Hd., N.W. ¾ W., and when distant about 9 m. (allow for tide) from the Lt., haul up E. by N. for Dungeness.

Bound S. of the Royal Sovereign shoals from about 1 m. off Dungeness, do not steer west of W. by S. until Beachy Hd. Lt. or Seaford cliff opens out.

To pass N. of the shoals from Hastings, keep Fairlight mill (see foot note p. 76) on with the E. end of St. Leonards, E. by N. ¼ N.

Small vessels rounding Beachy Hd. should give it a berth of ¾ m. in fine weather to avoid the ledge, and 2 m. in bad weather to keep outside the ripplings and heavy broken sea.

EASTBOURNE and PEVENSEY BAYS.—Eastbourne bay affords good shelter with the wind north of W. or north of N.E. by E., in 3½ fms. abreast the Grand Redoubt, with Willingdon ch. spire open W. of Redoubt, and the towers N. of Langley Pt. just opening E. of it.

Pevensey bay has good anchorage for small vessels with the wind west of W.S.W. Anchor in 3½ fms., sand and mud, abreast the third tower N. of Langley Pt., with Beachy Hd. signal-ho. just open of Langley Pt., or Pevensey ch. N. ½ E.

Between Beachy. Hd and Langley Pt. foul ground and shoal-water extends nearly ½ m., and in Pevensey bay 1 m. from the shore. Westham ch. open E. of Grand Redoubt leads E. of Hollywell ledge; and Hurstmonceaux ch. spire on with Westham ch. N.N.E. ¼ E., leads between it and Royal Sovereign.

BEXHILL is on the first rising ground W. of St. Leonards; it has on its summit a ch. with a low tower amongst trees, and W. of it a remarkable high house.

Fairlight mill (see foot-note p. 76) over the W. end of St. Leonards, leads S. of Bexhill reef (which lies ⅓ m. off shore, S. by E. to S.S.W. of Bexhill ch.), also outside Coxheath shoals of 8 to 12 ft. water to the W.

HASTINGS is in a valley between two hills. On the W. hill are the ruins of the old castle, and 3 windmills. St. Leonards is a continuation of Hastings to the W. The anchorage here is only used to wait tide, for with the wind south of W. a heavy sea rolls in. Anchor with Fairlight high coast-guard well open of the cliff.

The rocky ledges bordering the shore are dangerous when covered. The best beaching-place for boats is near the E. part of the town, and the two *fixed* Lts. (see p. 103) in one, N.N.E., lead to it.

Pier.—Hastings and St. Leonards pier is of iron, erected on screw piles, screwed into blue clay. Its length over all is 910 ft.; the abutment from promenade being 184 ft. long, 100 ft. wide, the main body of the pier 426 ft. long, 43 ft. wide, and pier hd. 300 ft. long, 124 ft. wide. There is 6 ft. at pier hd. at the lowest spring tides. A pavilion, 120 ft. by 80 ft., stands 72 ft. within the pier hd., and on its top is a *fixed green* Lt.

BOULDER and TOWER SHOALS lie abreast the martello towers between Fairlight and Rye. Tower shoal is 1 m. off shore, and from its shoalest part of 6 ft., the 3rd tower E. of Hook Pt. is on with Dogshill mill, which is black, and stands W. of the thick wood at Winchelsea, N. ½ W. The Boulder is a ridge of sand, coarse gravel, and stones, of 2½ fms. least water, lying 1¼ m. off shore.

Clearing Marks:—St. Leonards well open of the E. cliff at Hastings leads S. of the Boulder; and Playden ch. steeple on with turret of Rye ch. leads *well* E. Coming from the E., when Fairlight ch. bears N., a vessel drawing 19 ft. may stand over the 4-fms. sand ridge (a continuation of the Boulder to the S.E.) and tack in-shore abreast Fairlight cliffs by the lead.

RYE HARBOUR, chiefly used by coasters, is difficult of access, and requires a pilot. The entrance is between the *dolphin* on the outer end of the pier on E. side, and the *beacon*, 30 ft. high, surmounted by a black ball, on the outer end of the high work on W. side; from the end of this high work a low fagot groyne runs out S. by E. 300 ft., and its extreme is marked by a small *black* buoy. A steam-tug is always in readiness, and the signal for her is a wift at the peak or burgee at the main. When a black ball is hoisted at the harbour flagstaff, in bad weather or low tides, it signifies that pilots cannot come off, and that strangers cannot approach with safety. There is 15 and 16 ft. in the harbour at H.W. sps., 10 and 11 ft. at H.W. nps. Sps. rise 16 ft. at the point, 12½ ft. at the town, and 11½ ft. at the float sluice. The flood runs in round the beach 6 kts. at sps., but its rate lessens inside.* There is a patent slip which will take a 400 ton vessel and a smaller one.*

Tide Signals.—Two *fixed white* Lts., 180 yds. apart, 47 and 24 ft. respectively above H.W., and visible 5 m., are shown near Camber, on the N. side of entrance, while there 10 ft. and upwards on the bar.

A *red* Lt., at 32 ft. above H.W., is shown on W. side of entrance during nps. when 8 ft. at gauge-board, and continues until 10 ft., when it is extinguished, and the two usual white Lts. exhibited: when there is not 10 ft. flow of tide the *red* Lt. is shown till H.W. When 12 ft. at gauge-board the *red* Lt. is again shown, in addition to the other two *white* Lts., and is kept burning till the water lowers to 12 ft., when it is extinguished.

There is also a *red* Lt., 19 ft. above H.W., on the *dolphin*, to show the end of E. pier. It is lit when it is flood at the pier, and burns until 2 h. after H.W. These two red Lts. in one bear N. ½ W.

A *green* Lt. is also shown from ½ flood to ½ ebb at the extreme of new groyne on W. side of entrance.

The two *fixed white* tide Lts. in one, N. by W., lead over the sand in front of the entrance, in the same depth of water as the harbour signals indicate, and between *green* Lt. on groyne and *red* Lt. on end of E. pier, distant from each other 87 yds. N.E. and S.W.

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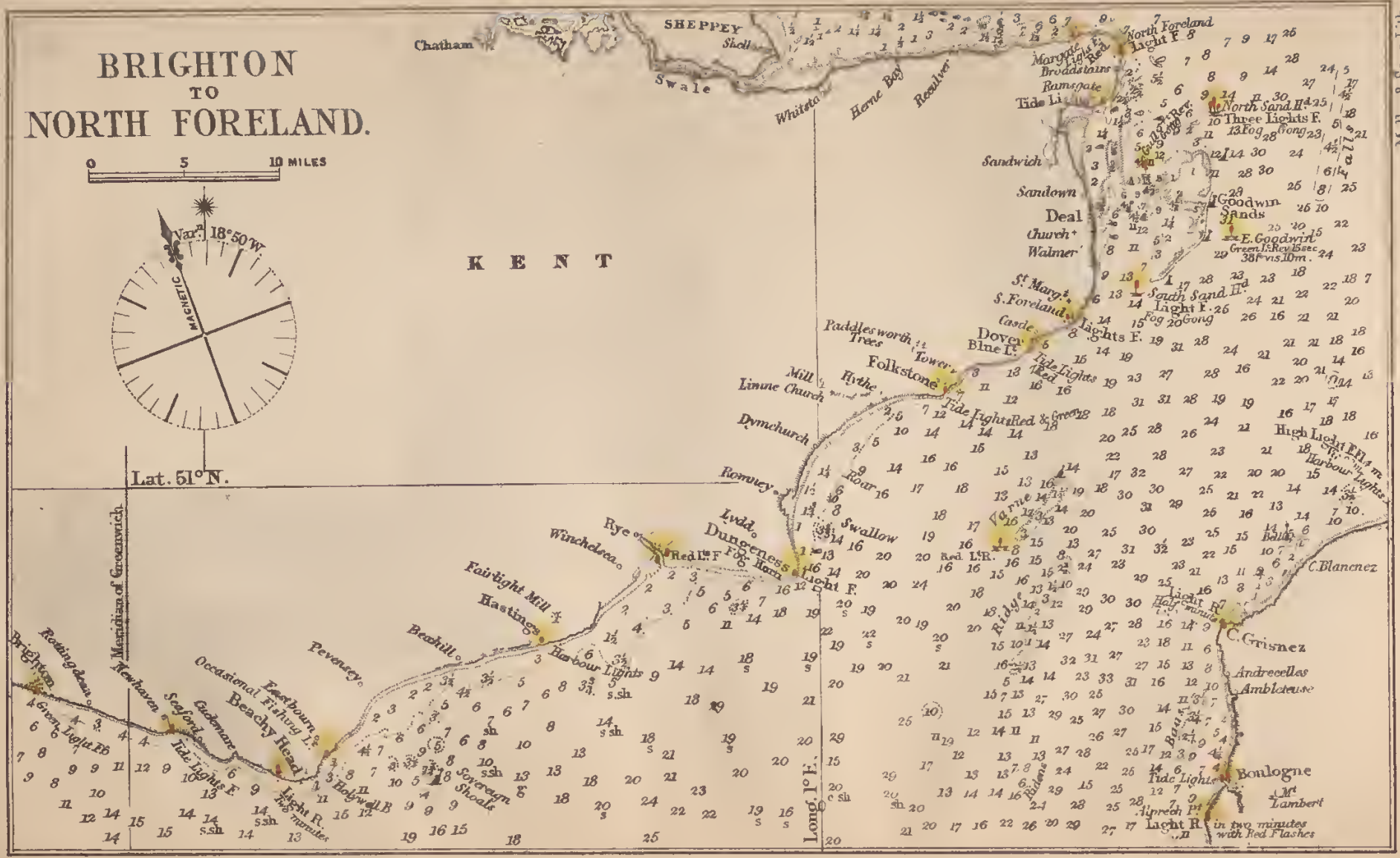
* Additions to 1874 by Mr. W. D. Hoad, Harbour Master.

Plate 12.

BRIGHTON TO NORTH FORELAND.



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By day, a Telegraphic flagstaff and yard-arm, fitted with two shutters, at harbour entrance, shows flowing of tide.

For 8 ft. water, one shutter of the Telegraph is canted; for 9 ft., both shutters; for 10 ft., a red ball at masthead without the shutters; for 11 ft., the red ball with one shutter; for 12 ft., the red ball with both shutters; for 13 ft., the red ball, both shutters, and one black ball on yard-arm; for 14 ft., the red ball and two black balls; for 15 ft., the red ball and three black balls; for 16 ft., the red ball and four black balls; for *high water*, a blue pennant under the red ball at the masthead.

DIRECTIONS.—Approaching Rye, look out for the *black* buoys on the low water W. edge of the channel. Leave them to port, and the *red* and *white* buoy to starboard; then steer to pass between the *dolphin* on the E. and the *beacon* on the end of the high work on the W.

From thence leave all the broom-beacons on low stonework to starboard, and the triangular beacon and beach to port. When abreast the pilots' houses, anchor, or make fast to the berthing-places on the E. shore.

DUNGENESS.—To the E. of Rye, and between it and Hythe, is an extensive level tract of land called Romney marsh, and near its extreme S.E. Pt. stands Dungeness Lt.-ho., 92 ft. high, coloured *red* and *white* in alternate *horizontal bands*, and shows a *fixed white* (electric) Lt. The anchoring-ground on each side of Dungeness is marked by a *red* Lt. (see p. 103). The shingle-beach at the Pt. is low and flat, only 4 ft. above H.W. sps., and steep-to.

Dungeness Lt.-ho. was erected in 1792, at 100 yards' distance from the extreme Pt. at L.W., but in consequence of the rapid accumulation of beach to seaward, it was in 1870 distant 422 yards W.N.W. from the Pt. In order, therefore, for the better defining the extreme Pt., a conspicuous *beacon* of *wood*, consisting of a mast 50 ft. high, with two large globes placed vertically thereon, was erected on it in December 1871, at 17 yds. from H.W. mark, about 400 yds. S.E. ½ E. from the Lt.-ho. Although the Pt. is steep-to, *caution* is still necessary, as the beach is gradually extending seaward, tho *beacon* being in May, 1873, 40 yds. from H.W. mark.

FOG HORN.—A powerful Fog Horn is sounded in foggy weather from Dungeness Lt.-ho. The mouth of the Horn traverses an arc from N.E. by E. ½ E. (round south) to W. ½ N., and *vice versâ*, and points in every direction between those bearings from the Lt.-ho. *once in each minute*;—the duration of the sound is 5 *seconds*, and the interval is 20 *seconds* between each blast.*

DUNGENESS ROADS afford good anchorage according to the wind. The W. road shelters from N.E. winds as far round as E. by S. The best berth is in 6 fms., with Romney ch. tower on with Lydd ch. N.E. ¾ E., and

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* It is singular that now there is this powerful horn, vessels are constantly going on the beach. The lead appears quite neglected, and they run with a fair wind, making sure they must hear the horn before they strike, and when they are picked up find themselves 2 m. inside the Lt.-ho.

Dungeness Lt.-ho. E. ¼ S. At night, anchor *when the red Lt. below electric Lt.* comes in sight (see p. 103). Small vessels anchor nearer the beach, but guard against a sudden shift of wind.†

The E. road shelters from W. winds, between S.W. and N. by E. The best berth is in 7 fms., with Lydd ch. just open N. of No. 2 battery, N.W. by W. ¾ W., and the Lt.-ho. S.W. by W. ¼ W. Steamers take a berth nearer the shore according to their draught. At night, anchor *when the electric Lt. shows red.*

STEVENSON SHOAL is a narrow sand ridge of 19 to 23 ft. water, and 4 to 5 fms. around it. Its E. end is W. ½ S. 3½ m. from Dungeness Lt.-ho.; from thence the ridge extends ¾ m. in the same direction.

† *Clearing Marks*:—E. mill at Lydd on with No. 4 coast-guard, N.N.E. ½ E., leads E. of E. end of shoal in 5 fms. Rye ch. on with new ch. spire near Rye harbour, N.N.W. ¾ W., leads W. of W. end in 27 ft. Fairlight ch. and mill in line, W. by N. ¾ N., leads ½ m. S.W. of shoal. S. Foreland and Dungeness Lts. in line, E.N.E., lead ¾ m. S.

NEWCOMBE, SWALLOW, and ROAR are sand banks lying off-shore between Dungeness and Dymchurch. The *Newcombe* is an accumulation of sand contiguous to the beach, and its outer edge is marked by a *black* and *white chequered* buoy; there is 5 fms. water close outside the buoy.

The *Swallow* is in Dungeness E. road. From its shoalest spot of 18 ft. Dungeness Lt.-ho. bears S.W. ¼ W., 2¾ m., and Romney ch. N.W. by N., 3 m.

Clearing Marks:—Lydd ch. open N. of 2nd battery N. of Lt.-ho., N.W. by W. ¾ W., leads S. of Swallow in 5 fms.; and the Lt.-ho. W.S.W., or Beachborough summer-ho. on with Hythe ch., N.E. by N., leads E. At night, the Newcombe and Swallow will be cleared by keeping Dungeness *white* Lt. in sight, S.W. by W. ¼ W.

The *Roar* is a narrow ridge of 9 to 12 ft. water running parallel to the coast at 1¼ m. from H.W. mark. It commences abreast Romney bay, then trends N.E. by N. 2½ m., and terminates in 14 ft. S.S.E., 1¼ m. from Dymchurch. There are 2 and 3 fms. between it and the shore. Do not shoal towards it under 6 fms. at L.W.

SANDGATE ROAD affords good shelter with the wind north of E. by N. Anchor abreast the castle with the pier-clock at Folkestone just open of Mill Pt., in 6 to 8 fms., mud and clay, good holding-ground.

When standing towards Hythe flat, between Dymchurch and Shorncliffe, if the vessel is of large draught go about *directly* the S. Foreland high Lt.-ho. or Lt. is shut in by Shakspeare cliff (see p. 5).

FOLKESTONE HARBOUR has an area of 14 acres, quay room for 12 brigs beside the company's 10 steamers, but is never used for refuge. There is 20½ ft. water between pier-hds., and 17 ft. in harbour at H.W. sps.; and 14 ft. between pier-hds., and 13 ft. in harbour at H.W. nps.; the rise, how-

* Three pilot-cutters cruise between Dungeness and the S. Foreland: one of them will be found off Dungeness; another in the fairway between Dungeness and Dymchurch; and the third off Folkestone, well out in the fairway.

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ever, is much influenced by the wind. There is 5 ft. more at the entrance than at the head of harbour. Vessels drawing 13 or 14 ft. can enter at H.W. sps. The entrance is awash at L.W. sps.

A new pier runs out 120 yds. S.E. from the horn of S. pier, to prevent a shingle bar, and to shelter the entrance from W. gales. The depth is 12 ft. at the pier-end at L.W. sps. There is a patent slip in the harbour that will take a vessel of 560 tons and 8 ft. draught; and a gridiron for the use of vessels not exceeding 9 ft. draught.

Tide Signals.—A *fixed red* Lt. is shown from the Lt.-ho. on S. pier-hd. of harbour, when there is 10 ft. water between the pier-hds. A *white* Lt. is shown under the above red Lt. when there is above 16 ft. When red Lt. is blinked at intervals caution is necessary. When Lts. are not shown, there is less than 10 ft., or some obstruction in fairway, or harbour is inaccessible.

A *fixed* Lt. is shown *all night* from the Lt.-ho. on the end of the new pier, S. ¼ W., westerly, 212 yds. from the Lt.-ho. on S. pier-hd. The Lt. on the new pier shows *green* from E. by N. ¾ N. (round south) to W. ½ N., or seaward of a line passing 65 yds. outside the Oak End rocks on W. side of pier, and the same distance outside Mole Hd. rocks on E. side of pier; in-shore, or N. of this line, it shows *white*. The Lt. therefore changing from green to white indicates that the vessel is in the *stream* of danger.

By day a *red flag* is hoisted half-mast on flagstaff on S. pier-hd. when there is 10 or 14 ft. water between pier-hds., and quite up when 14 to 16 ft.; when above 16 ft. a *black ball* is shown under *red flag*. When flag is hauled down to base of flagstaff, caution is necessary. When flag is not shown, there is less than 10 ft., or some obstruction in fairway, or harbour is inaccessible.

DIRECTIONS.—Entering Folkestone, remember that on the flood there is a strong set towards S. pier-hd., and an eddy along shore from Copt Pt. to entrance. Royal George hotel (which has three large stacks of chimneys) on with Lt.-ho. on S. pier-hd., leads W. of Mole Hd. rocks, which dry ¼ m. off shore on E. side of entrance; but if any swell, keep hotel open S. of Lt.-ho. until the vessel is within 300 ft. of pier-hds. The Wesleyan ch. will be nearly in transit with this leading mark, for its E. gable will appear touching the W. end of the hotel, and its lofty steeple a little open S. of pier Lt.-ho.*

The anchorage off Folkestone is exposed and limited. If waiting tide to go in, anchor in 7 to 10 fms., clay and sand, with S. pier Lt.-ho. on with E. houses near N. side of harbour bearing N., and the ch. on with terrace on beach W. of clock-ho. At night, keep the red Lt. a little open W. of green Lt.

There is temporary anchorage, good holding-ground, in Eastware bay, sheltered from W. by Copt Pt. If waiting tide, anchor in 5 fms. abreast coastguard under cliffs, with Folkestone ch. a little open of Copt Pt.

From thence to Shakspeare cliff the water is deep and the ground foul. Shakspeare cliff (the first chalk cliff W. of Dover) when seen from the W. has a conical appearance.

* Additions to 1874 by Captain J. F. Boxer, R.N., Harbour Master.

DOVER, 5½ m. E. of Folkestone, has a good tidal harbour, but the entrance between the piers is only 140 ft. wide, and open to the S.E. There is 19 ft. water at entrance at H.W. sps., and 12 to 15 ft. at nps.; but the depths depend upon the winds. The Admiralty pier, running out S.S.E. 533 yds. from the land on the W. side of entrance, protects it from the W.; large vessels can go alongside this pier at any time of tide.

The Outer harbour has an area of 12 acres, Inner harbour 6 acres, and Pent 11½ acres. The Outer harbour has 17 ft. in it at H.W. sps., 10 to 13 ft. at nps., and dries 1 h. before L.W. In Inner harbour and in Pent there is only 1 ft. less water, the sills of gateways being 1 ft. above the level of Outer harbour. The patent slip in Pent will take a vessel of 500 tons.

Tide Signals.—Two *red* tidal Lts., of unequal heights, are shown from a staff on Dover S. pier-hd., and a small low *red* Lt. on N. pier-hd. This latter *red* Lt., and a similar *red* Lt. on low outer corner of S. pier, are shown when there is 7 to 10 ft. water at entrance; the two red Lts. on Staff on S. pier, and low red Lt. on N. pier when above 10 ft., and till the water has fallen again to that level; and the single low red Lt. on each pier when 10 to 7 ft. These Lts. only point out the position of the piers, and do not indicate the channel.

A *green* Lt. is shown *all night* from the cross-wall near the clock-ho.; and when seen between the piers, leads into the fairway to and up the harbour. A *blue* Lt. is exhibited at the extreme end of Admiralty pier, and a bell is sounded in foggy weather.

By day a *red* flag is hoisted with a *black ball* under it, while from 7 to 10 ft. water at entrance; the red flag alone when from 10 to 13 ft.; and the ball over it when 13 ft. and upwards. No signals are made between 7 ft. ebb and 7 ft. flood. When the harbour is inaccessible, the flag is hauled down, or the Lt. or Lts. on S. pier not shown.

DIRECTIONS.—Dover bay affords shelter from N.E. winds. The Admiralty pier shelters with the wind W. of W.S.W.; but avoid anchoring with end of Admiralty pier on a S.W. by W. bearing, for on this line, between tidal periods of 5 hours' flood and ½ ebb, the eddy making to the W. out of the bay meets at the end of the pier the offing stream running E., and causes there a heavy sea in W. gales. Large vessels should therefore anchor outside this line in not less than 5½ or 6 fms. L.W., with the keep of Dover castle within or W. of Castle jetty, ⅓ the distance towards the Boundary groyne, bearing N. ½ W., and the end of the Admiralty pier bearing W. or W. by S.; Shakspeare cliff will then be nearly in line with inner landing-stage of Admiralty pier. Small vessels should anchor with entrance of Dover harbour open, and not farther out than to have the end of Admiralty pier bearing S.W. by S.

In fine weather anchorage can be taken in 5½ fms. with S. Foreland low Lt. *just closing* in with cliff, E. by N. ½ N., and the new large hotel on the parade, N.W.,—or anywhere abreast of esplanade.

Steering for Dover harbour, give the buoy off the end of Admiralty pier a

wide berth to avoid the eddy. The best time to enter is 1½ hour before, or 1 hour after, H.W. With *onshore* gales vessels require careful steerage, as the sea breaks across the entrance to the distance of ½ a cable.*

VARNE and RIDGE SHOALS, of coarse and broken shells, lie nearly parallel to each other in the fairway of Dover Strait, midway between the English and French coasts.

The *Varne* (between 7 fms. water at each end) is 4½ m. long N.E. by E., and its breadth varies from ½ to ¾ m. It is steep-to, and from the shoalest spot of 9 ft., which is 1 m. from its N.E. end, Dover castle bears N. by E. 8½ m. From its N.E. end, the South Foreland bears N. by E. ¾ E., 8¼ m., and Dover castle N. ½ E., 8 m. From its S.W. end, Dover castle bears N.N.E. 11¼ m., and Dungeness Lt.-ho. W. by N., 12½ m. There are always strong ripplings over it, and a heavy sea in bad weather.

A large *red* spiral *buoy*, with *staff* and *ball*, and marked N.E. Varne, lies in 13 fms. off the N.E. end of Varne. The *Lt.-vessel*, which lies in 16 fms., about 1 m. W. by N. ½ N. from the depth of 7 fms. on S.W. end, has one mast with ball at masthead, and shows a quick *revolving red* Lt.

The *Ridge* (between 7 fms. water at each end) is 8¼ m. long N.E. ¼ E., and ¾ m. broad. It is steep-to, and from its shoalest spot of 6 ft., which is 2¾ m. from the S.W. end, Varne Lt.-vessel bears N. ¼ E., 5 m., Cape Gris-Nez E. by S. ½ S., 10½ m., Dungeness Lt.-ho. N.W. by W., 13¼ m. There are always strong eddies over the ridges, and in bad weather the sea breaks on shoalest parts.

The N.E. end of Ridge is 2 m. S. of the body of Varne, and there are 16 to 20 fms. in the channel between. From N.E. end in 7 fms., Cape Gris-Nez bears S.E. ¼ S., 8¾ m., the high trees at the back of Hythe are on with Swiss terrace, Sandgate, N.N.W. ½ W., and Varne Lt.-vessel W. by N. ¾ N., 4 m.

Clearing Marks:—Folkestone ch. seen between two conspicuous chalkpits on face of distant hills, N.W. ⅔ N., clears N.E. end of Varne in 7 fms., and leads 1 m, N.E. of the shoal patch of 9 ft., and 2 cables S.W. of Varne buoy; and the E. terrace at Sandgate seen between the above chalkpits, N. ¾ W. (or square tower of Lympne ch. on with Lympne windmill), clears S.W. end.

Mount Lambert (a conspicuous hill with fort on it near Boulogne), on with the dome of the new cathedral at Boulogne, S.E. ½ E., or Swiss terrace, Sandgate, between the two chalkpits, N. ⅓ E., or Cape Gris-Nez Lt.,† E. ¼ S., leads S. of S.W. extreme of Ridge in 9 fms.

BASSURELLE SHOAL, of sand, is (within the depth of 10 fms.) 5 m. long E.N.E., and 2 m. broad. From its shoalest part, of 22 ft., Dungeness

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* Additions to 1874 by Mr. R. Iron, Harbour Master.

† Cape Gris-Nez Lt. is a *revolving white electric* Lt., the eclipses of which succeed each other every *half-minute*, and are not total from a vessel's deck in clear weather within 12 m. of the Lt. The *fixed white* Lt. at Calais is varied every *four minutes* by a *white flash*. The *fixed white* Lt. at Cape Alprech is varied every *two minutes* by a *red flash*, see p. 106.

bears N. ¼ E., 17¾ m. It is steep-to, has strong ripplings over it at springs, and in bad weather the sea breaks heavily on its shoalest parts.

BULLOCK BANK, lying S. ¼ W., 11 m. from Dungeness, has 9 to 10 fms. over it, 17 fms. at ½ m. N. and S., 11 to 14 fms. between it and S.W. end of Ridge, and is indicated by strong ripplings. Romney ch. a little open E. of Dungeness Lt.-ho. N. ¼ E., leads over it in 9 fms.

SOUTH TO NORTH FORELAND.

VARIATION, 18° 40′ W.

SOUTH FORELAND is a bold headland of irregular chalk cliffs 226 ft. high, having layers of flint* in *horizontal* lines. On its summit are two white Lt.-houses, 449 yds. apart, which in line, W. by N., lead 1 m. S. of Goodwin. The W. or high Lt.-ho. is square; the E. or low Lt.-ho. is octagonal, and stands near the edge of cliff. They each show a *fixed white electric* Lt. of great power and brilliancy.

NORTH FORELAND.—From the S. Foreland the chalk cliffs continue as far as Kingsdown. From thence to 1¾ m. of Ramsgate the shore is low, bordered by a beach of shingle and sand; chalk cliffs then again occur, and continue round the N. Foreland.

The N. Foreland is a promontory faced by nearly perpendicular chalk cliffs, 60 to 120 ft. high. On a rising ground 300 yds. within their edge is an octagonal white Lt. tower, which shows a *fixed* white Lt. (see p. 105.) At ½ m. N. of the Lt.-ho. is Moro castle; and ½ m. farther N. is Neptune tower, both close to the brink of the cliff.

GOODWIN SANDS occupy a space about 8½ m. long N.E. and S.W., and 3 m. broad at its N. part, which is called N. Goodwin; the south portion is called S. Goodwin, and tapers to the S.W. Along the S.E., E., and N. sides large patches dry from 7 to 4 ft. at L.W. The sands are constantly in motion, and influenced by the prevailing winds. On their W. side, between S. Goodwin and Fork, is Trinity bay. On E. side is a *Refuge beacon* with cage on top, 50 ft. high, and reached by steps. Four large conical buoys and a Lt.-vessel mark the S.E. and E. sides of the Goodwin, but keep ½ m. E. of the buoys in passing, as the tide sets strong over the sands. For description of these buoys, and those in Downs and Gull Stream, see. p. 117. (For Lt.-vessels, see p. 104.)

SHOALS inside GOODWIN.—The Gull Stream divides the Goodwin from the Brake sand and the shoals off Ramsgate.

Deal Bank, a small patch of 18 ft. water, at ⅔ m. off shore abreast Deal,

* The chalk cliffs W. of Dover have no strata of flints in them; a good mark in hazy weather.

is marked by a *chequered black* and *white* buoy in 4 fms. (this bank is increasing in height).

Brake Sand, 4½ m. long N.N.E. and S.S.W., and ½ m. broad within the 2-fms. line, has shoal patches of 2 to 9 ft. (For description of buoys, see p. 118.)

North Bar, a small knoll of 12 ft. water in N. part of Gull Stream, is marked by a *black* and *white horizontally striped* buoy.

Gull Sand is a narrow irregular ridge 1 m. long N.N.E. and S.S.W., with 18 ft. on shoalest part. At ¾ m. S.E. of this depth is a *chequered black* and *white* conical buoy in 6 fms. Large ships should pass E. of this buoy, as there is only 21 ft. water between it and the Gull sand.

The Elbow, of 18 ft. least water, is a small shoal forming an elbow in a vessel's track to the Thames. A *black* and *white vertically striped* buoy, with *staff* and *cage,* lies in 5 fms. close to its E. Edge.

As there are patches of 16 and 18 ft. between this shoal and the land, vessels of near that draught should not attempt the passage at L.W.

Broadstairs Knolls.—Besides the above patches, there are numerous others in the Inner channel to Ramsgate, and W. of Gull and Elbow, which render the inshore passage only fit for vessels of light draught. Of these, the Broadstairs knolls of 9 to 20 ft. lie off Broadstairs, and on their outer edge, 1¼ m. off shore, is a *chequered black* and *white* buoy, in 3¼ fms.

ANCHORAGE in DOWNS.—Large ships anchor S. of the line of Upper Deal ch. on with Deal castle W. by N.; those drawing less than 16 ft. anchor N. of that line. A good berth for a large ship is about 1 m. off shore in 8 fms., chalk bottom, with Upper Deal ch. a little open S. of Deal castle, W. by N. ½ N.; and S. Foreland high Lt.-ho. (Low Lt.-ho. is not seen) over the middle of Old Stairs bay, S.W. When anchored, take a bearing of the S. Brake buoy, to assist in running through the Gull Stream in case of parting. If moored, have open hawse to the S.

The anchorage in Small Downs, 1¼ m. farther N. (see p. 88), is more secure, better holding-ground, and, for vessels of less than 15 ft. draught, more sheltered, shoaler water, and not so liable to be drifted on by other ships. It is comprised between the following limits:—Ruins of Sandown castle to the west of W.N.W., and the Halfway ho. (north of No. 1 Battery) to the north of W., from ½ to 1 m. from the shore, in from 3¼ to 5 fms. at L.W. This anchorage is far preferable to that of Ramsgate channel, which has bad holding-ground.

The TIME BALL is daily dropped from the mast of the Royal Signal tower at Deal, to give Greenwich Mean Time to vessels in the Downs. The ball is raised half-mast high at 5 m. before 1 h. P.M., and raised to the top at about 3 m. before 1 h. P.M. It is dropped by an instantaneous galvanic current from the Royal Observatory, Greenwich, exactly at 1 h. P.M., Greenwich Mean Time. The time to be noted is the instant at which the ball *begins to fall* from the cross arms of the vane.

If, in consequence of galvanic accident, the ball is dropped too late or too

soon, a *black* flag will be hoisted, and will remain raised till 15 m. before 2 h. P.M. The ball will again be raised, and dropped by hand at 2 h. In these cases the accuracy of the time cannot be guaranteed within two seconds. If the wind is very heavy the ball will not be raised at all. The Signal tower stands about 800 ft. northward of Deal castle in lat. 51° 13′ 16″ N. long. 1° 24′ 21″ E.

Pier.—A pile pier runs out 1,100 ft. from the esplanade at Deal, and ships in the Downs can be supplied with fresh water from the pier into their own casks at any state of the tide, there being 10 ft. at pier-end at L.W. A *fixed red* Lt. is shown at outer end of pier.

DIRECTIONS from S. FORELAND to N. FORELAND.—*To pass E. of Goodwin from S. Foreland,*—steer for S. Sand Hd. Lt., after passing which, keep S. Foreland Lts. in line, W. ¾ N., or S. Sand Hd. Lt. on that bearing, till E. Goodwin Lt. bears N.E. ½ E., or S. Goodwin buoy N. by W. Then steer for E. Goodwin Lt. on a N.E. ½ E. bearing, and on an opposite bearing after passing her, till N. Sand Hd. Lts. bear North, when keep them on that bearing, and the vessel will pass ½ m. outside N.E. Goodwin buoy, which should not be approached nearer if the wind be light and the western stream running, for there would then be great danger of being drifted on the sand.

If intending to anchor in Downs,—round the S. Foreland about 1 m. distant in 12 to 14 fms., and when the Lt.-houses are in line, W. ¾ N., or Deal town comes in sight, steer N.E. by N. for the anchorage.

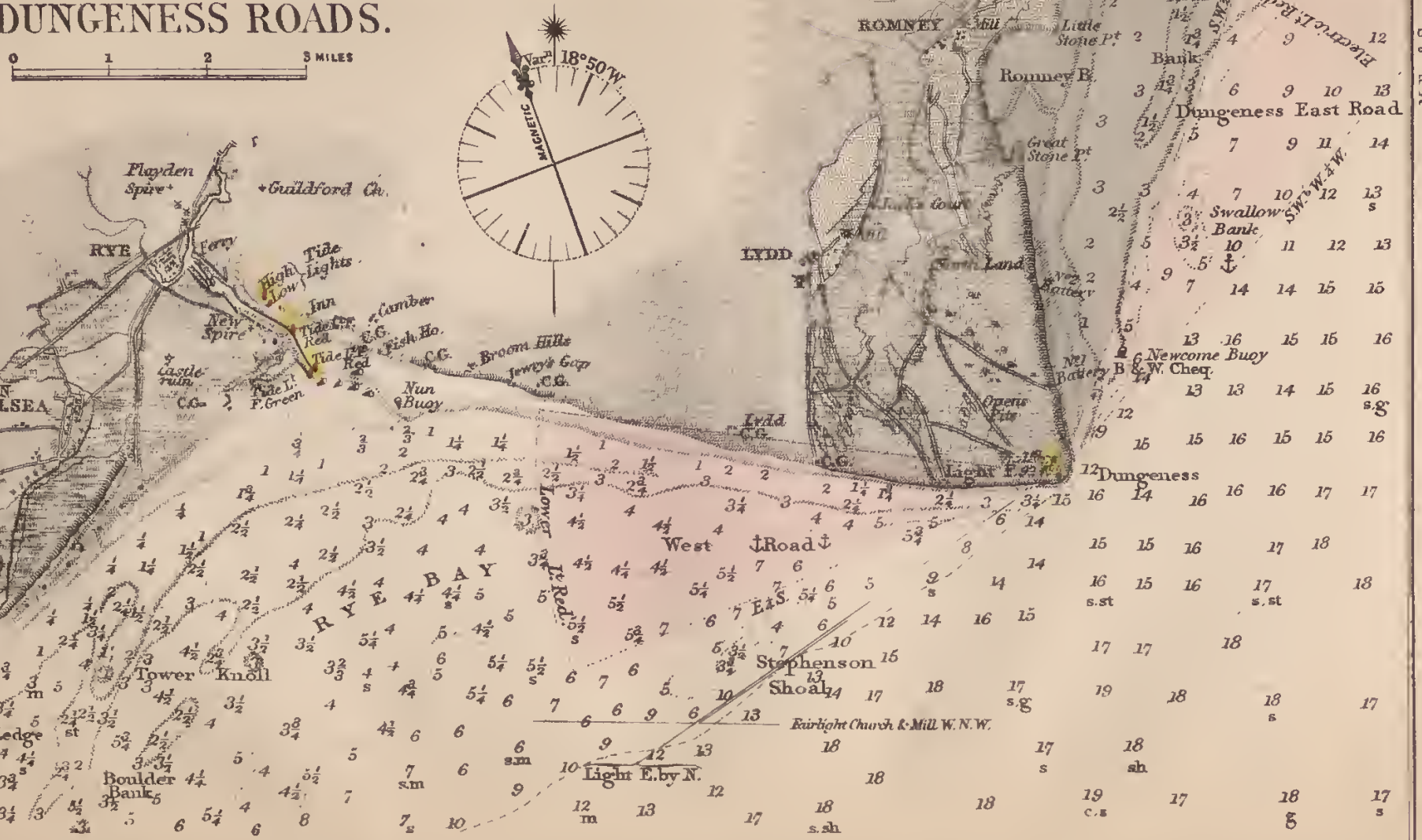
If bound through Gull Stream,—having rounded the S. Foreland as above, steer along shore to the northward till S. Foreland high Lt.-ho appears directly over *middle* of Old Stairs bay, S.W. (or high Lt. S.W. at *night*), which is the *general* leading mark through the Gull Stream, observing that this mark leads close eastward of a L.W. depth of 24 ft., lying ½ m. S. by W. ¾ W. of S. Brake buoy. When past Gull Lt.-vessel, the above *general* mark kept on, or the Lt.-vessel kept S.W., will lead through the remainder of Gull Stream to a position 2 cables eastward of Gull buoy, with N. Foreland Lt. N.N.W. ½ W. and N. Sand Hd. Lts. E. by S. ½ S.; when haul out easterly if bound eastward; or if bound to the Thames, steer N. by E. ½ E. to pass ½ m. eastward of Elbow buoy, from whence a N. by W. ¾ W. course will lead to E. buoy of Margate sand. Remember, whichever stream is running, to allow for nearly a *beam* tide when proceeding from Gull buoy towards the Thames. Ramsgate and St. Lawrence churches in line, N.W. by W. ⅔ W., leads about 3 cables S. of N. Sand Hd. Lts., and just clears N. edge, in about 5 fms., of Goodwin knoll.

A vessel parting her cables in the Downs during a S.W. gale should steer to pass about 3 cables eastward of S. Brake buoy (*a correct bearing of which should always be taken before dark*); if S. Foreland high Lt. and Gull Lt. are seen, steer with the former, bearing S.W., or the latter N.E. After passing on either side of the Lt.-vessel, keep her S.W., and when N. Foreland Lt. is N. by W. ½ W., or N. Sand Hd. Lts. E. by S. ½ S., haul out to the eastward and lie to.

Working to the S. at the back of Goodwin,—do not shoal towards the sand to less than 30 or 28 fms., nor bring the N. Sand Hd. Lts. east of N., until E.

Plate 13.

DUNGENESS ROADS.



Malby & Sons, Lith.

Goodwin Lt. bears S.W. ½ W. This Lt. may now be used when standing towards the Goodwin, but do not bring her S. of S.W. ½ W. when to the northward of her, nor E. of N.E. ½ E. when to the southward; until S. Foreland Lts. come in line, W. ¾ N., when the vessel can act according to circumstances. If wishing to anchor in the Downs steer for S. Sand Hd. Lt., from whence a N. ¾ E. course for 4½ miles, or keeping the Lt. on a S. ¾ W. bearing will lead to anchorage in the Downs.

Ripple mill over Kingsdown ch., N.W. ¾ W., or Upper Deal mill over Walmer castle, N.W. ⅔ N., lead in 6 fms. over tail of S. of S. Sand Hd.*

Working through Gull Stream,—do not attempt to *work* to the S.W. until ½ ebb, nor to the N.E. until ½ flood. *Working* to the S.W.,—stand towards Goodwin knoll and to N.W. side of N. Goodwin, till Gull Lt.-vessel is in line with Deal castle, or outer end of Deal pier, S.W. by W. ½ W. Stand towards Gull and North bar, with S. Foreland high Lt.-ho. just open S. of N. cliff of Old Stairs bay, S.W., southerley, until below North Bar buoy, or until Ramsgate mill comes in line with Ramsgate W. pier, N.W. ¾ W., when the vessel may stand to the Brake, till S. Foreland high Lt.-ho. is well open W. of Kingsdown church, S.W. ½ S., until below Middle Brake buoy, after which she can stand towards the Brake until below S. Brake buoy, with N. Foreland Lt.-ho. its apparent breadth open E. of Broadstairs N. cliff N. by E. ½ E.

Stand towards N.W. Bunt and Bunt Hd. till S. Foreland high Lt.-ho. is on with E. Bottom semaphore, S.W. ¼ W.; and towards S. Brake till the N. Foreland Lt.-ho. is its breadth open E. of Broadstairs N. cliff N. by E. ½ E. Having passed Bunt Hd. buoy, the Gull Stream is cleared, and a vessel may stand towards the S. Goodwin till S. Sand Hd. Lt.-vessel is S.W. by S. (but nothing west of S.W. by S. as S. Sand Hd. is approached); stand towards Deal bank to 7 fms.; and towards the shore southward of it by the lead.

At night, a vessel will be abreast North Bar buoy when the *green* Lt. on W. cliff at Ramsgate is in line with W. pier-hd. Lt., N.W. by W.

RAMSGATE has an outer harbour between stone piers, and an inner harbour divided from the outer harbour by stone walls, forming a quay on the top. The entrance to outer harbour is about 208 ft. wide between pier-hds., and the average depths there at H. W. are as follows:—When H. W. between the hours of 12 and 1, 20 ft.—between 1 and 2, 19¾ ft.—between 2 and 3, 19½ ft.—between 3 and 4, 18¾ ft.—between 4 and 5, 17¾ ft.—between 5 and 6, 17¼ ft.—between 6 and 7, 16¾ ft.—between 7 and 8, 17½ ft.—between 8 and 9, 17½ ft.—between 9 and 10, 18½ ft.—between 10 and 11, 18¾ ft.—and between the hours of 11 and 12, 19¾ ft. Spring tides will occasionally rise to 22 ft. at H.W., and neap tides to 18 or 19 ft. with strong N.W. winds, but with strong southerly gales the neaps have risen only to 14 ft. at H.W. Mean spring L.W. level is 5 ft., but the tides will sometimes fall to 3 ft. with strong southerly winds. There is about 6 ft. at L.W. in the berths alongside the E. and W. piers in the outer harbour, except with very low tides.

* S. Sand Hd. Lt. vessel having been moved 1 m. S.S.W. of her old position, it is proposed to mark S. Sand Hd. with a buoy.

The inner harbour is entered by single gates; its E. entrance is 29½ ft., and W. entrance 40 ft. wide, and the depth over sills 14 ft. at H.W. sps., and 12 ft. at nps.; but the rise and fall is much influenced by the force and direction of the winds, the rise being more with N. winds, and less with S. winds. There is a graving dock, but it is thoroughly out of repair, and not likely to be rebuilt. The patent slip will take a vessel of 500 tons register tonnage.*

A *flashing* white Lt. is exhibited *all night* from an iron pillar on the E. pier of the harbour. It illumines an arc of 224°, or from the direction of the Dike buoy (round S.) to the centre of the basin-gates of W. entrance of inner harbour.

Tide Signals.—A *fixed red* Lt. is shown from the stone Lt.-ho. on W. pier-hd. while there is 10 ft. water and upwards between the pier-hds., or from 2 h. before until 4 h. after H.W.; when less than 10 ft. a *green* Lt. is shown instead of red. A plain *flash* Lt. is shown from E. pier-hd. to conduct vessels when nearing the harbour with greater safety. By day a *red ball* hoisted on W. cliff near Jacob's Ladder indicates 10 ft. and upwards between the pier-hds.

A *green* Lt. is also shown from the W. cliff, to lead (when in line with the tide Lt. in W. pier Lt.-ho.) in best water through Old Cudd channel. Another *green* Lt. is shown from the E. cliff, to lead (when in line with the W. pier Lt.) in best water from the Middle Fairway buoy in Ramsgate channel.

DIRECTIONS.—There are three Fairway buoys in Ramsgate channel inside the Brake sand:—N. Fairway buoy, *striped red* and *white vertically* (conical), lies in 6 ft., at 4 cables S.W. by W. ¾ W. from Ramsgate pier Lt.-ho Middle Fairway, *chequered red* and *white* (can), in 2½ fms., at $2\frac{1}{10}$ m. S.W. by S from Ramsgate pier Lt.-ho., No. 2 Battery bearing S.W. ¾ W., 1¾ m. S. Fairway, *striped red* and *white vertically* (can), lies in 16 ft., with Middle Fairway buoy N. ¼ E., $1\frac{3}{10}$ m.; Gull Lt., S.E. by E. ½ E., $1\frac{2}{10}$ m.; S. Brake buoy, S. by E. ¾ E., 1¾ m. Vessels of more than 11 or 12 ft. draught cannot use this channel at L.W. sps., as there is then only 12 or 13 ft. water from Middle Fairway buoy to Ramsgate.

Running from the Small Downs to Ramsgate in a S.W. gale,—weigh before the tide has done running to the S.W., and steer N. by E. ½ E., for the S. Fairway buoy; but with a large fleet at anchor there, the vessels frequently extend as far N., and even beyond this buoy, the holding-ground being very good and the water smooth, and in case of a sudden shift of wind from the N.E., some shelter from the Brake. From the S. Fairway buoy steer N. ¼ E. for the Middle Fairway buoy, or, if the buoy should be gone, till Woodnesborough ch. and St. Clement's ch. are in line, W. ½ S.; when heave-to, if the 10-ft. red ball is not hoisted.

The best time to enter, if not drawing more than 10 ft., is 2 h. before H.W. The course from the Middle Fairway buoy to the Lt.-ho. is N.E. by N., but with the N.E. tide running, head in close to the N. Fairway buoy, lying

* Additions to 1874 by Mr. R. Braine, Harbour Master.

4 cables S.W. by W. ¾ W. from the Lt.-ho. Passing *close outside* this buoy, steer for the W. pier-hd., keeping a large *diamond patch* (*white* upon *black* ground) on landing platform *full in view* until the vessel is within the entrance.

About 2 h. before H.W. in the harbour, the stream begins to set to the N.E. without the pier-hds, and continues in that direction 6 h. If setting N.E. keep good sail on and steer *close* to the W. pier-hd., and if not time to run a warp out to a buoy, throw all aback, and anchor; if no anchor, run on the E. bank (sand and mud), towards pier-house. The E. bank dries about 5 ft., and the W. bank about 2 ft., above L.W. ordinary springs.

Working N. *through Ramsgate channel*,—stand towards the shore by the lead, tacking towards the flats off No. 2 Battery *before* St. Lawrence ch. comes on with W. Cliff lodge, N. by E. ¼ E.—tack towards the S. end of Brake when the water deepens to 4½ or 5 fms., as it is steep-to; but when as far up as Sandwich ch. bearing W. by N., do not bring Ramsgate Lt.-ho. N. of N. by E. ½ E., keeping a good look-out for the ripple on the Brake. N. Foreland Lt. or Lt.-ho. shut in with E. end of trees at E. Cliff lodge, N.N.E. ¾ E., clears the W. side of Brake, night or day. To clear W. edge of Cross ledge, tack when Ramsgate ch. is just W. of tide flagstaff; when tide-ball is hoisted, there is 18 ft. water on the ledge.

At night, never run for Ramsgate for refuge, except the vessel is in real distress; and to do this, the exact bearing and distance of the S. Fairway buoy should be known, and a look-out kept for the 10-ft. signal being made.

When abreast the Middle Fairway buoy, or when the Gull Lt. bears S.E. ¾ S., steer for the harbour with the *green* Lt. on E. cliff in line with W. pier Lt. N.E. by N.; but take care, when approaching close to the harbour, to occasionally open and shut the *green* Lt. with Albion house—otherwise the vessel will be too far out, and liable to miss the entrance, the tide running very strong across it.

Old Cudd Channel, with 8 ft. in it at L.W. sps., is between the *chequered black* and *white* buoy in 7 ft. on N. end of Quern, and *black* buoy in 10 ft. on S. end of Dike. Bound through towards Ramsgate, bring Pugin's house (it has a square tower, and stands on W. cliff), its breadth open south of W. pier, N.W. by W. ½ W., which will lead between the buoys. After passing the buoys steer W. by N. for N. Fairway buoy, or till *diamond patch* comes open of E. pier, when steer for the harbour as before.

At night, when less than 10 ft. in entrance of harbour, the *green* Lt. on W. cliff in line with the *green* Lt. in W. pier Lt.-ho., leads through the channel. When 10 ft. and upwards in entrance the green Lt. in Lt.-ho. is not shown; then the *green* Lt. on W. cliff in line with the *red* Lt. in Lt.-ho. leads through.

Sailing-vessels will run some risk in using this channel at night during the ebb; for when the W. stream makes (at ½ ebb) it shoots across the channel, and if the vessel is not quick with her helm she will be ashore.

BROADSTAIRS HARBOUR, at 2 m. N.E. of Ramsgate, is formed by a

pier, but its entrance is exposed to the sea driven in by E. winds. There is 16 ft. at the pier-end at H.W. sps., 10 ft. at nps.; the harbour dries at low tide. The anchorage off the harbour is in 20 ft at L.W. with Ramsgate pier Lt.-ho., just open of N. cliff of Ramsgate, S.W. ¾ W., and Water tower in line with Coast-guard on N. cliff of Broadstairs, N.W. by W. ½ W.

CHANNEL STREAMS.*

THERE are two streams in the English Channel running in opposite directions at the same time. They are each about 180 m. in length, and are separated by Dover Strait, the limits of which is between a line joining Beachy Hd. to the River Somme, and a line joining N. Foreland to Dunkerque. To make the description plain, we will name them E. and W. Channel streams.

The W. Channel stream is contained between the W. end of Dover Strait and a line joining the Start to Casquets; the E. Channel stream, between the E. end of Dover Strait and a line joining Lynn Wash to the Texel. These streams, as just stated, run in *opposite* directions at the *same time*, both setting uniformly in a direction *towards* Dover while the water is *rising* at that place, and *away* from it while it is *falling*.† They also run in opposite directions to the two streams outside them—viz., the stream at the mouth of the Channel,

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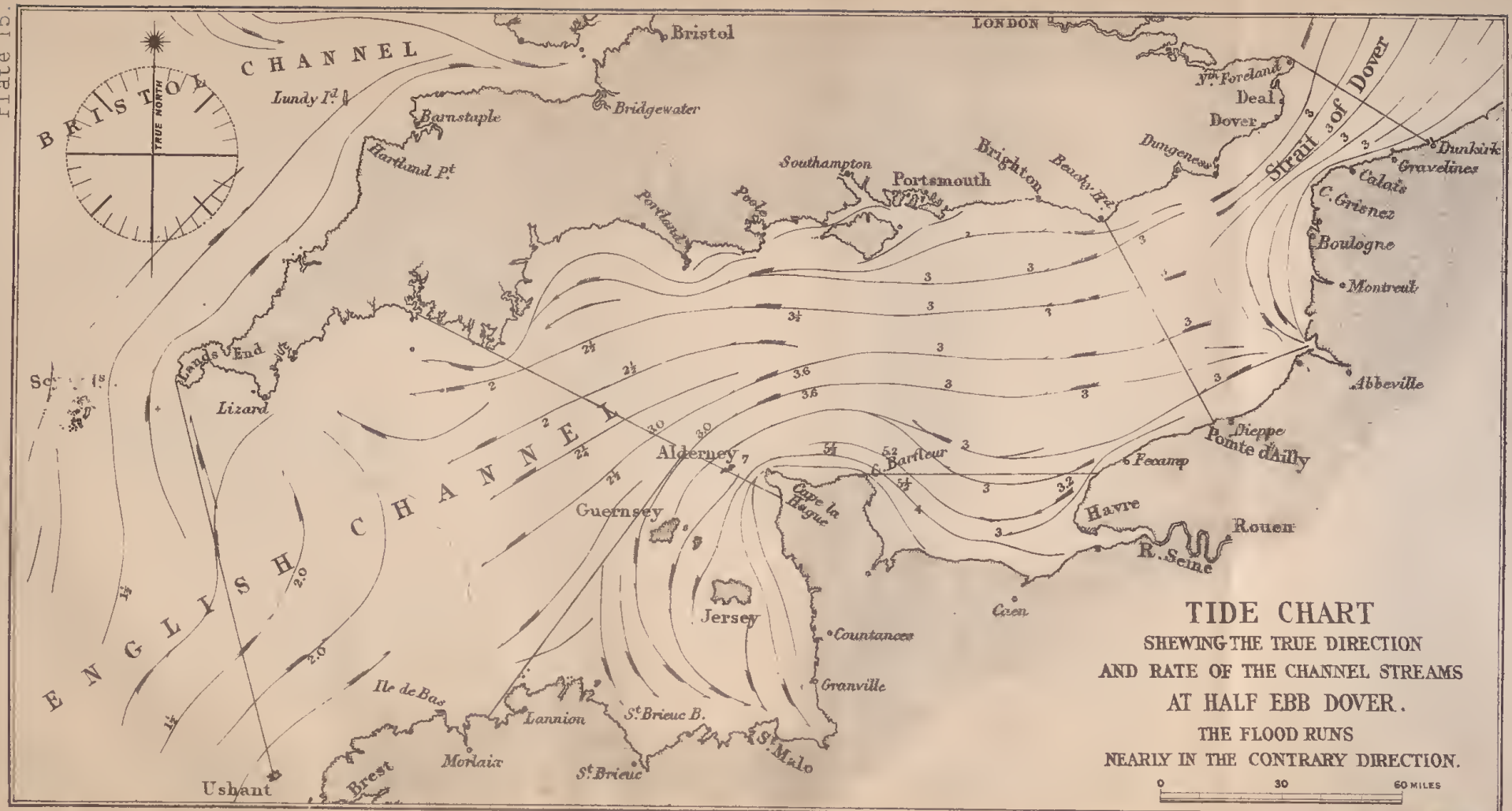
* By reference to the Tide Table at p. viii., it will be seen that while it is H.W. at one end of the Channel, it is L.W. at the other end; but this inversion of the tide is sudden, not progressive. For example, the Bill of Portland and St. Catherine Pt. are only 44 m. apart, and yet it is H.W. at the latter when it is L.W. at the former—viz., on or about noon on F. & C. days; in fact, the whole 6 h. difference is confined within this space, the range of tide being nearly the same in both cases.

It is therefore important for the seaman to know that not only does this inversion of tide take place somewhere near the assumed position of the Channel node or hinge of the tide at Swanage, which is equidistant between these two places; but that in all places westward of the node it is H.W. F. & C. nearly at the same time, between 5 and 6 o'clock, and at all places eastward of the node between 11 and 12 o'clock. And as the tidal streams *turn everywhere* in the Channel at high and low water on the shore at Dover, or at 11 h. and 5 h., F. & C., the western or outgoing stream drains all the harbours eastward of the node, while it is filling those to the westward, and *vice versâ*; *the same stream* making a high or low water, according as the position is east or west of the Channel node.

† The direction of the streams at every hour of the tide at Dover is given in Table at pp. 94, 95. Thus, if the vessel is in the *centre* of the space between a line joining Start to Casquets, and a line joining Beachy Hd. to Pointe d'Ailly—at 3 h. *after* H.W. at Dover she will have the stream running N.W. by W. ¾ W.; at 3 h. *before* H.W. at Dover she will have it running S.E. by E. ¾ E.

Plate 15.



TIDE CHART

SHEWING THE TRUE DIRECTION
AND RATE OF THE CHANNEL STREAMS
AT HALF EBB DOVER.

THE FLOOD RUNS
NEARLY IN THE CONTRARY DIRECTION.

0 30 60 MILES

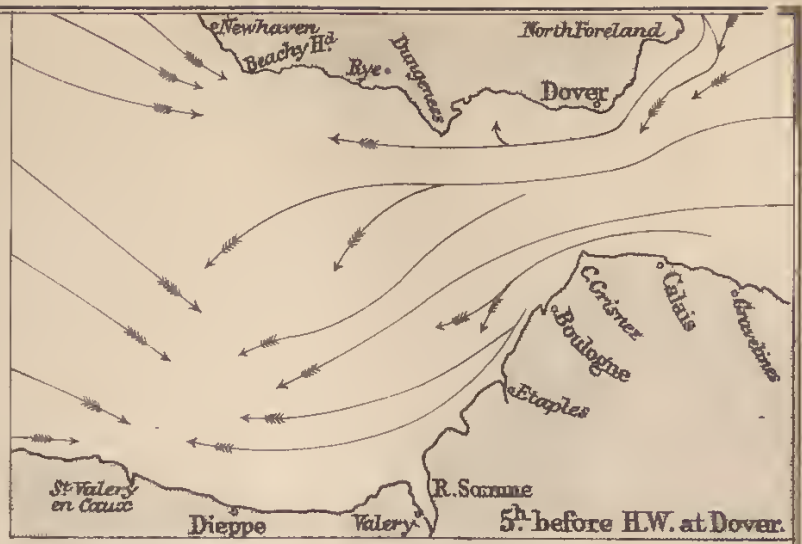
Malby & Sons. Lith

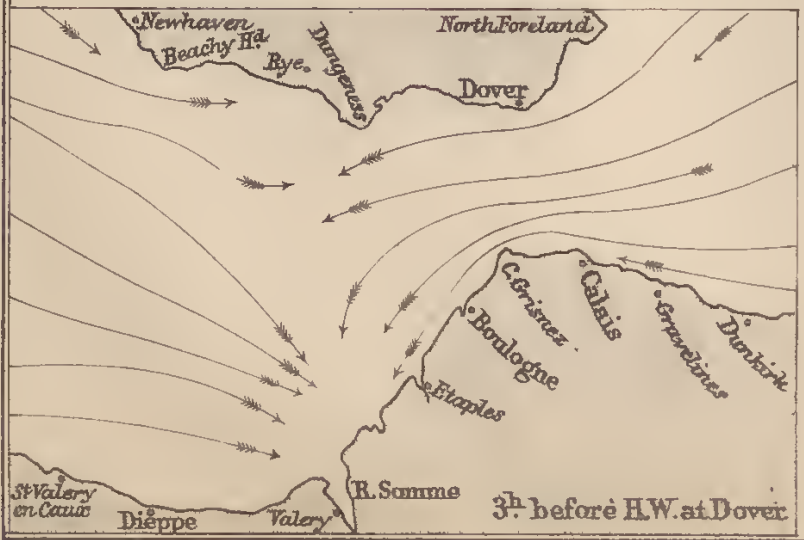
Plate 16

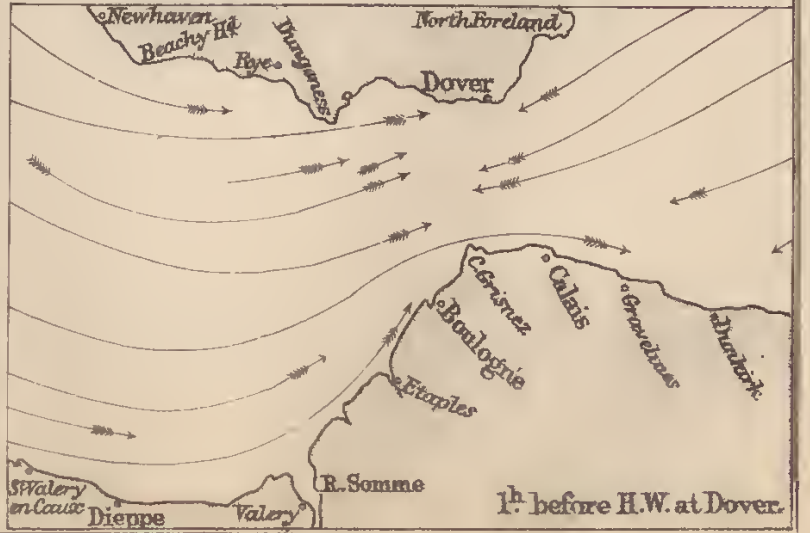
MEETING OF STREAMS IN DOVER STRAIT.

When water at Dover begins to rise
the streams meet at Beachy Head.

When water at Dover begins to fall
the streams separate at Beachy Head.







Malby & Sons, Lith.

SEPARATION OF STREAMS IN DOVER STRAIT.

Plate 17.

Malby & Sons, Lith.

and the stream in the North Sea. Where they meet these outer streams the tides are rotary, with scarcely any interval of slack water. See Plates 16 and 17, which illustrate the meeting and separation of the streams in Dover Strait at different hours of the tide; and Plate 15, which shows the *true* direction and rate of the Channel streams at half-ebb at Dover.

The outer stream at the mouth of the Channel, although materially influenced by indraught and outset, runs between N. and E. while the water is falling at Dover, and S. and W. while it is rising.

Between a line joining the Land's End to Ushant, and a line joining the Start to the Casquets, is a mixed tide, influenced by the Channel and offing streams. Eastward of the *latter* line is the Channel stream, which will carry a vessel towards Dover while the water is rising there, and away from it while it is falling. (See Plate 15.)

The *change* of stream does not differ materially within its fair navigable limits, so that if vessels were anchored at several distances apart in the fairway between the Start and Beachy Hd., they would all swing in the *same direction* nearly at the *same time*. Both flood and ebb streams turn from 1 h. to 2 h. earlier in the bights of the coast than in the offing, of which vessels take advantage when turning to windward.

The strong tides in the Gulf of St. Malo will influence a vessel when drawing near the locality of the Casquets, and as this is the narrowest part of the Channel westward of Beachy Hd., it is necessary to *use great caution*; for should a stranger be in this supposed southerly position during a winter's night, at a period when the indraught is strong into the Gulf, and with a gale between N.W. and S.W., the consequences may be most disastrous. With a *falling* water at Dover, the stream curves round Cape de la Hague, and sets sharply into the Gulf on both sides of the Channel Islands, which W. winds increase; but with a *rising* water it sets out of the Gulf on both sides, the N.W. part sweeping round Bréhat and the Sept isles, the N.E. part round the Casquets towards Alderney, and also through the channels about Guernsey towards Alderney race—then round Cape Barfleur into the Baie de la Seine, taking the sweep of the French shore.

On approaching Boulogne at the beginning of a rising tide, recollect that the Channel streams meet thereabouts, and *turn down* upon the French coast; so that a vessel, which on the English side would have a stream setting her straight up Channel, here encounters one on her *beam*, sweeping her down towards the French shore.

The Channel Streams *meet* in Dover Strait while the water is *rising* at Dover, and *separate* while it is *falling*. (See Plates 16 and 17.) The point of meeting is not, however, stationary, but moves from W. to E. between Beachy Hd. and the N. Foreland, both on the rising and falling water. When the water at Dover begins to fall, the line of separation begins off Beachy Hd. As the fall continues this line *creeps* to the E. At 2 h. after H.W. at Dover it has reached Hastings—at 3 h. Rye; and thus it travels on until L.W. at Dover, when it has reached the line extending from the N. Foreland to Dun-

kerque. At this time both Channel streams are slack, but the Dover Strait tide* is still running to the W.

When the water at Dover begins to *rise*, the Channel streams have made, and both set towards Dover; the E. Channel stream, consequently, goes with the Dover Strait tide, which has not ceased running to the W., while the W. Channel stream meets it, and this opposition continues throughout the rising water at Dover. The line of meeting begins off Beachy Hd. at L.W., and gradually creeps to the E. as the water rises. The line of meeting at 4 h. before H.W. is nearly the same as the line of separation at 2 h. after H.W., and so it *creeps* on, till about the time of H.W. at Dover the point of junction has reached the N. Foreland, and the Channel streams are again slack, leaving the Dover Strait tide still running to the E. Within the next hour the Channel streams have made E. and W., so that now the Dover Strait tide falls in with the E. Channel stream, and travels with it; whilst it separates from the W. Channel stream, dividing at Beachy Hd., as at first.

It will be seen from the above that, if a vessel is off Hastings when the streams meet there, she will have a continuation of the E. stream for 4 h. longer, and if sailing 8 kts., will carry it to the N. Foreland.†

About 1½ h. before H.W. at Dover, the line of *meeting* of the streams has passed E. of Dover, and at 1 m. S.S.E. of S. Foreland (at that time) the stream begins to set eastward, and runs from N.E. by E. to E.N.E. about 5½ h. or till 4 h. after H.W.: it then turns and sets W. by S. ¾ S. about 7 h. In the Downs, the N.E. stream begins about 1 h. 20 m. before H.W. at Dover, and runs 5½ h.; it then turns and sets S.W. till 2 h. before next H.W. In Gull Stream, near Bunt Hd., the N.E. stream begins about 1 h. 10 m. before H.W. at Dover, and runs 6 h.; it then turns and runs in the contrary direction till 1½ h. before next H.W. Its northern direction is N.E. ¾ N.; but it changes the last hour to E.N.E., and even south of E. The last hour of southern stream changes from S.W. by S. to W.S.W., and even north of W.

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* The stream in Dover Strait, although it obeys first one Channel stream and then the other, does not slack with them, but is still running at H.W. and L.W. by the shore, at which times the Channel streams are slack, so that Dover Strait never has slack-water throughout its whole extent at any one time; this, therefore, I have named the Dover Strait tide.—J. W. K.

† Strong W. gales prolong the E. stream, and retard the W. stream. At such times the streams at the Ridge shoal have been found to run 8 h. to the N.E., and only 4 h. to the S.W.

INSHORE STREAMS BETWEEN PORTLAND AND OWERS.

The E. or flood stream, when clear of Portland Race and Shambles (see p. 40), runs for the coast W. of St. Albans Hd., then to the E., sweeping round that Hd. 4 or 5 kts. at sps. Within 1½ m. of Durlston Hd. it sets into Poole and Christchurch bays, but outside of 1½ m. it runs for the Needles, and *dangerously* so towards Brook and Atherfield ledges. At 2½ m. off Durlston Hd. it sets in a curve 2½ m. outside St. Catherine Pt., off which it runs 4 or 5 kts. E. of this Pt. it is sucked into the bight between the island and main, but not so as to overcome its course to the E. as it passes 5 m. S. of Owers.

Within this stream there is at the same period an Inner stream, which, at ½ m. inside the Shambles, sets *dangerously* in for the coast towards Kimeridge ledges; closely and sharply round St. Albans Hd.; then, at a less rate, round Durlston and Peverel Pts., and expends itself in Poole bay. It then skirts the shore, runs smartly over Christchurch ledge, when it is again weak until it approaches the Needles, when it runs strong over Dolphin and Shingles.

This Inner stream splits at the Needles, one part running up the Solent and through Spithead, the other following every bend and turn of the S. coast of Isle of Wight to Bembridge Pt., where, at 1 m. N.E. of the Nab rock, it re-unites with the other portion through Spithead. From thence these united streams set towards Selsea Bill, into Bracklesham bay, and over the Owers, 2 or 3 kts., according to the distance off shore.

The *reverse* of the above is applicable to the course of the W. stream, which at 9½ h., F. & C., or 4½ h. after the commencement of the E. stream in offing, has made inshore from Selsea Bill, through Spithead to Portland.* Near H.W. at Portsmouth, or at 11½ h., it divides near the Nab rock; one part still running through Spithead, the other over the Princessa and round Dunnose to the W. until ½ ebb by the shore, when (the Spithead tide having slacked) the rapid discharge of the last ½ of ebb from Southampton Water and Portsmouth harbour beats back from its course the Spithead tide, converting the W. into an E. stream, which near the Nab rock meets the regular Channel ebb, and with it sweeps round S. of the Isle of Wight.

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* This W. stream unites near the Nab rock with last ½ of flood or offing stream which is running round the E. end of Isle of Wight, and together they run through Spithead, giving increased effect to the flood in filling the harbours, until the offing stream has turned, at 11 h., thus making a rising tide of 7 h. (see p. 64.) This not only affects the rise of tide in Portsmouth, Langston, and Chichester harbours, but it makes what is called a *second* high-water, which takes place at Southampton and Hurst 2 h., Christchurch 2½ h., Poole 3½ h., Swanage 4 h. after the first H.W. At Christchurch, Poole, and Swanage it may be called a second rise, as it takes place between H.W. and L.W. The influence of the second tide is felt as far as Portland.

Magnetic Direction of Tidal Streams in English Channel at every Hour of the Tide at Dover.*

Westward of Line joining Ushant to Lands End.

Hours.	North side of Lat. 49° N.						South side of Lat. 49°.	
	West part.	Rate.	Near Scilly.	Rate.	Seven Stones.	Rate.	West part.	Rate.
After H.W., Dover. 1	W. by N. ¼ N.	Greatest rate, springs, 1¼ knots.	N.N.W. ¼ W.	Greatest rate, springs, 1¼ knots.	N. ¼ W.	Greatest rate, springs, 1·6 knots.	W. ¼ S.	Greatest rate, springs, 1¼ knots.
After H.W., Dover. 2	N. ¼ W.		N. ¼ W.		N.N.E.		N. by W. ¼ W.	
After H.W., Dover. 3	N.E. ¼ E.		N.N.E.		N.E. ¼ N.		E. by N. ¼ N.	
After H.W., Dover. 4	E. by N. ¼ N.		N.N.E.		N.E. ¼ E.		E. by N. ¼ N.	
After H.W., Dover. 5	E. by N. ¼ N.		N.E. by E.		N.E. ¼ E.		N.E. by E. ¼ E.	
After H.W., Dover. 6	E. ¼ S.		E. ¼ S.		E. by N. ¼ N.		Turning.	
Before H.W., Dover. 5	S.E. by E. ¼ E.		. . .		S. ¼ W.		S. by E. ¼ E.	
Before H.W., Dover. 4	S. ¼ E.		South		S.S.W. ¼ W.		Draining.	
Before H.W., Dover. 3	S.S.W. ¼ W.		S.W.		S.S.W. ¼ W.		S.W. ¼ W.	
Before H.W., Dover. 2	S.W. by W.		S.W. by W.		S.W. ¼ S.		S.W. ¼ S.	
Before H.W., Dover. 1	W. by S. ¼ S.		S.W. by W.		W.S.W.		S.W. by W. ¼ W.	

Between Lines joining Lands End to Ushant, Start to Casquets, and Casquets to Sept Isles.

Hours.	North side of Channel.						South side of Channel.					
	West part.	Rate.	Centre.	Rate.	East part.	Rate.	West part.	Rate.	Centre.	Rate.	East part.	Rate.
After H.W., Dover. 1	W. by N. ¼ N.	Greatest rate, springs, 2 knots.	W. ¼ N.	Greatest rate, springs, 1¼ knots.	W. ¼ N.	Greatest rate, springs, 2¼ knots.	W. ¼ S.	Greatest rate, springs, 1¼ knots.	W. ¼ N.	Greatest rate, springs, 1¼ knots.	W. ¼ S.	Greatest rate, springs, 2 knots.
After H.W., Dover. 2	Turning.		N.W. by W. ¼ W.		W. ¼ N.		Slack.		West.		W. by S.	
After H.W., Dover. 3	N. ¼ E.		W. ¼ N.		West.		East.		Slack.		W.S.W.	
After H.W., Dover. 4	E. ¼ S.		Slack.		S. ¼ W.		E. by N.		E. by S. ¼ S.		S.E. by S.	
After H.W., Dover. 5	East.		E. ¼ S.		S. E. ¼ S.		E. by N. ¼ N.		E. ¼ S.		S.E. by E. ¼ E.	
After H.W., Dover. 6	E. by S.		E. ¼ S.		E. by S. ¼ S.		E. ¼ N.		S.E. by E. ¼ E.		S.E. ¼ S.	
Before H.W., Dover. 5	E. by S. ¼ S.		E. by S.		E. by S.		E. ¼ S.		E. by S.		E. by S. ¼ S.	
Before H.W., Dover. 4	Slack.		E. by S. ¼ S.		E. ¾ S.		N. E. by E. ¼ E.		Slack.		E. ¼ N.	
Before H.W., Dover. 3	Turning.		Slack.		E. ¼ S.		Slack.		W.N.W.		Northb.	
Before H.W., Dover. 2	W. by N.		W. ¼ N.		Turning.		S.W. by W. ¼ W.		Slack.		W. by N. ¼ N.	
Before H.W., Dover. 1	W. ¼ S.		W. ¼ N.		W. by S. ¼ S.		S. W. by W.		W. by N.		N.W. ¼ W.	

Between Lines joining Start to Casquets, and Beachy Head to Pointe d'Ailly.

Hours.	West part.	Rate.	Centre.	Rate.	East part.	Rate.	Over Hurds Deep.	Rate.	Off Cape Barfleur.	Rate.
After H.W., Dover. 1	W. ¼ N.	Greatest rate, springs { flood 2·3 / ebb 2·4 } knots.	W. by N. ¼ N.	Greatest rate, springs { flood 3·6 / ebb 3·3 } knots.	Turning.	Greatest rate, springs { flood 3·00 / ebb 2·40 } knots.	W. ¼ S.	Greatest rate, springs { flood 2·15 / ebb 2·40 } knots.	N.W.	Greatest rate, springs { flood 5·4 / ebb 5·2 } knots.
After H.W., Dover. 2	W. by N. ¼ N.		N.W. by W. ¼ W.		W. by N. ¼ N.		W. ¼ S.		N.W.	
After H.W., Dover. 3	W. ¼ N.		N.W. by W. ¼ W.		W. by N. ¼ N.		W. ¼ S.		N.W.	
After H.W., Dover. 4	W. ¼ S.		W.N.W.		W. ¼ N.		W.S.W.		N.W.	
After H.W., Dover. 5	W. ¼ S.		W.N.W.		W. by N.		W. by S. ¼ S.		N.W.	
After H.W., Dover. 6	N.N.E. ¼ E.		W. by N. ¼ N.		W. by N.		Slack.		N.W.	
Before H.W., Dover. 5	E. ¼ S.		E.S.E.		E. by S. ¾ S.		E. ¼ S.		S.E.	
Before H.W., Dover. 4	E. by S. ¼ S.		S.E. by E. ¼ E.		E. by S. ¼ S.		E. ¼ S.		S.E.	
Before H.W., Dover. 3	E. by S. ¼ S.		S.E. by E. ¼ E.		E. by S. ¾ S.		E. ¼ S.		S.E.	
Before H.W., Dover. 2	E. by S. ¼ S.		S.E. by E. ¼ E.		E. by S. ¼ S.		E. ¼ N.		S.E.	
Before H.W., Dover. 1	E. by S. ¼ S.		E.S.E.		E. ¼ S.		E.N.E.		S.E.	

* The time of high water at Dover is taken as a standard, so that to find either the time of turn, or the direction of stream in Channel, compare mean time of ship with time of H.W. at Dover, and the interval between in column answering to ship's position will be found the information required. (See foot-note, p. 90).

Entrance of Gulf of St. Malo on Line joining Brebat to S.W. side of Guernsey.

Hours.		12 m. from Brebat. Course.	Rate.	12 m. from Guernsey. Conrse.	Rate.	Near S.W. Pt. of Guernsey. Course.	Rate.	4 m. W. by S. from Casquets. Course.	Rate.	4 m. W.N.W. of Cape de la Hague. Conrse.	Rate.
After H.W., Dover.	1	N.W. by W.	Uncertain.	W. ¾ N.	Uncertain.	W. ¼ N.	Uncertain.	W. ¾ S.	Uncertain.	S.W. by W. ¾ W.	Greatest rate, springs, 5 to 7 knots.
	2	S. ½ W.		S. ½ W.		S.S.W. ¼ W.		S.W. ½ W.		S.W. by W. ¾ W.	
	3	S. ¾ W.		S. ¾ W.		S.S.W. ¼ W.		S.W. ½ W.		S.W. by W. ¾ W.	
	4	S.E. ¼ S.		S.S.E. ¾ E.		S.E. by E. ½ E.		S. by E. ½ E.		S.W. ¼ S.	
	5	S.E. ¼ S.		S.E. ¾ E.		S.E. by E. ½ E.		S.E. ½ E.		S.W. ¼ S.	
	6	S.E. ½ S.		S.E. ¼ S.		S.E. by E. ½ E.		S.E. ½ E.		N.E. by E. ¾ E.	
Before H.W., Dover.	5	S.E. ¼ E.		S.E. by E.		S.E. by E. ½ E. to E. ¼ N.		E. ¾ N.		N.E. by E. ¾ E.	
	4	S.E. ½ E.		S.E. by E.		S.E. by E. ½ E. to E. ¼ N.		N.E. ½ N.		N.E. by E. ¾ E.	
	3	N.W. by W.		N.W. ½ N.		E. ¼ N.		N.E. ½ N.		N.E. ¼ N.	
	2	N.W. by W.		N.W. ½ W.		N. by W. ¾ W.		N.E. by E. ½ E.		N.E. ¼ N.	
	1	N.W. ¾ W.		W. by N. ¾ N.		N. by W. ¾ W.		N.W. ½ W.		N.E. ¼ N.	

In Baie de la Seine, S. of Line joining Cape Barfleur to Cape Antifer.

Hours.		West part.	Rate.	Centre.	Rate.	East part.	Rate.
After H.W., Dover.	1	N.N.W. ¾ W.	Greatest rate, springs {flood 4·2 ebb 3·7} knots.	N.W. by W. ¾ W.	Greatest rate, springs {flood 3·2 ebb 3·2} knots.	W. ¼ N.	Greatest rate, springs {flood 3·3 ebb 3·0} knots.
	2	N.N.W. ½ W.		N.W. by W. ¾ W.		W. ¾ S.	
	3	N.N.W.		N.W. by W. ¾ W.		W. by N. ¼ N.	
	4	N.N.W. ¾ W.		N.W. by W. ¾ W.		W. ¼ N.	
	5	N.N.W. ¾ W.		N.W. by W. ¼ W.		W. ¼ N.	
	6	Slack.		N.W. by W. ¼ W.		W. ¼ S.	
Before H.W., Dover.	5	S.S.E.		S.E. by E. ¾ E.		W. ¼ S.	
	4	S.S.E.		S.E. by E. ¾ E.		E. by N. ¾ N.	
	3	S.S.E.		S.E. by E. ¾ E.		E. by N. ½ N.	
	2	S.E. by S.		S.E. by E. ¾ E.		E. by N. ¼ N.	
	1	S.E. by S.		S.E. by E. ¾ E.		E. by N. ¼ N.	

Between Lines joining Beachy Hd. to Pointe d'Ailly, and N. Foreland to Dunkerque.

Hours.		Remarks.	West of Line of separation.	East of Line of separation.	S. Sand Head. Course.	Rate.	N. Sand Head. Course.	Rate.
After H.W., Dover.	1	Tides separate on Line joining, Beachy Hd. and St. Valery	W. by N.	N.E. by E. ¼ E.	N.E. ¼ E.	Greatest rate, springs, 3·3	N.N.E.	
	2	" Hastings and Treport	W. ¼ N.	N.E. by E. ¼ E.	N.E. ¾ E.		N.N.E.	
	3	" Hastings and Cayeux	W. ¼ N.	E.N.E.	N.E. by E. ¼ E.		N.E. ¼ E.	
	4	" Folkestone and Calais	W. by S.	E.N.E.	N.E. by E. ¼ E.		E. by S.	
	5	" " S. Foreland and Gravelines	S.W. by W. ¼ W.	N.E. by E. ¼ E.				
	6	" Ramsgate and Nieuport, passing over N. Sand Hd., the S. Line of Falls, and banks off Nieuport	W. by S.	E. ¼ N and Northward	S.W. ¼ S.		S.S.W.	
Before H.W., Dover.		Tides meet on Lines joining,	Line of Meeting.					
	5	Beachy Hd. and Pte. d'Ailly	E.S.E.	S.W. by W. ¼ W.	S.W.		S.S.W.	
	4	" Bexhill and Cayeux, both streams turning down towards River Somme	S.S.E. ¼ E.	S. by W. ¼ W.	S.W. ¾ W.		S.S.W.	
	3	" Rye and River Somme, passing over Bassurelle, both tides setting to the Somme	S.E. by E. ½ E.	S.W. by W.	W. by S. ¾ S.		S.S.W.	
	2	" Dungeness and Touquet Pt.	E. by N.	W. by S. ¼ S.	W. ¾ N.		S.S.W.	
	1	" Dover and Dunkerque nearly	N.E. by E. ¼ E.	W.S.W.	N.N.E.		S.S.W.	

DESCRIPTION OF LIGHTS IN ENGLISH CHANNEL.

The distance Lts. are visible is calculated from a height of 15 ft. above the sea at H.W. Lt.-vessels have their Name painted on their sides, carry a Ball at *each* mast-hd., fire a Gun if a ship is seen standing into danger, and sound a Gong in foggy weather.

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather.*	Character of Light.
	ft.	ft.	miles.	
Bishop Lt.-ho. (*gray granite*), on Bishop rock, W. ¾ N., 4 m. from St. Agnes Lt.	147	110	16	*Fixed white* Lt. of 1st Order, visible all round, *except* when bearing between S.W. by W. and W. by N. ¼ N., when it is obscured by Scilly Ids.; a ray of Lt. only being seen, bearing W. by S., between St. Martins and St. Marys. A bell is struck every *ten seconds* in foggy weather.
St. Agnes Lt.-ho. (*white*), on summit of St. Agnes island.	74	138	17	*Revolving white* Lt., which attains its greatest brilliancy every *minute.* Seen all round, except when bearing between S. by W. and W., when (except at *short* intervals) it is obscured by N. islands of group.
Seven Stones Lt.-vessel, in 42 fms., at 2 m. E. ½ N. from Pollard, and 2 m. N.E. by E. ¾ E. from South Stono. Has *two* masts.	– –	fore. 20 main 38	10	*Two Fixed white* Lts. *Marks:*—St. Martins day-mark W. by S. ¼ S., 9 m.—Longships Lt. E. by S. ¾ S., 12½ m.—Wolf Lt. S. E. by S., 12¼ m. A powerful Fog Horn is sounded at intervals of 10 *seconds*, in thick or foggy weather.
Longships Lt.-ho. (*white*) on western-most largest rock.	117¼	110	15½	*Fixed* Lt. of the 1st Order (see footnote, p. 9), which shows *red* towards Runnelstone, or when bearing between N.N.W. ¾ W. and N. by W.—shows *white* to the westward, or when bearing between N. by W. and S.S.W. ½ W.—shows *red* towards Brisons, or between S.S.W. ½ W. and S. W.—and a *red* light of less power towards the land, or between S.W. and N.N.W. ¾ W. A bell is struck *two strokes* in quick succession every 15 *seconds* in foggy weather.
Penzance Lt.-ho. (*white*) on S. pier-hd.	22	33	9	*Fixed tidal* Lt. (see page 10).
Wolf Lt.-ho. (*gray granite*), on Wolf rock, which is awash at H.W. neaps.	145	110	16	*Revolving* Lt. of 1st Order. It shows alternate *flashes of red and white* of equal intensity at intervals of *thirty seconds.* A bell is struck *three strokes* in quick succession, *every* 15 *seconds*, in foggy weather.

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather*.	Character of Light.
	ft. each	ft. E. Lt. W. Lt.	miles. each	
Lizard Lt.-houses (*white*) 74 yds. apart W. by N. and E. by S., on the cliff.	61	229 W. Lt. 232	21	*Two Fixed white* Lts.
Falmouth Lt.-ho. (*white*) on St. Anthony Pt., at E. side of entrance of harbour.	62	72	13	*Revolving white* Lt., shows a bright face every *twenty seconds*. Coming from the E., it opens of the land on a N.W. ½ N. bearing; coming from the W. it opens on a N.E. ½ N. bearing. A bell is struck every *alternate half minute* in foggy weather. It strikes 4 strokes at equal periods for the 1st half minute, and then a cessation for the 2nd half minute.
„ at 37 ft. below Revolving Lt.	- -	35	- -	*Fixed white* Lt., to lead E. of Manacles. It is only seen between bearings of N.N.E. ½ E. and N. by E. ¼ E.; the former bearing leads only 2 cables E. of Manacles.
„ from end of E. breakwater of Falmouth tidal harbour.	- -	27	3	*Fixed green* Lt.
Eddystone Lt.-ho. (coloured in *red and white horizontal bands*), on Eddystone rock, awash at H.W. sps.	89	72	13	*Fixed white* Lt. of 2nd Order. A bell is struck *five strokes* in quick succession *every* 30 *seconds* in foggy weather.
Plymouth Lt.-ho. (*white*), on W. end of Breakwater.	76	63	9	*Fixed* Lt. of 2nd Order, which shows *red* southward of an E. by S. ½ S. line from Lt.-ho. to Staddon Pt., round seaward, over Cawsand bay and up the Sound, as far as a N.E. ½ E. line from Lt.-ho. to Melampus buoy; but it shows *white* eastward of the latter line, or when it bears S.W. ½ W., and over all the anchoring ground within the Breakwater, and no vessel should anchor till the Lt. bears west of S.W. ½ W. A bell is struck *eight strokes a minute* in foggy weather.
„ „	- -	48	- -	*Fixed white leading* Lt. at 15 ft. *below* the above red Lt., to guide vessels through the W. channel. It is visible immediately after passing Draystone buoy from the W. and Knap buoy from the E., or *only* between bearings of N.E. by E. ⅔ E. and N.E. ½ E. When

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather*.	Character of Light.
	ft.	ft.	miles.	
Plymouth, *continued.*				scen, the channel is open, and vessels may run direct for Lt.
,, **Mill Bay** - -	- -	- -	- -	*Fixed red* Lt. (gas) on pier-hd., and a *Fixed green* Lt. on the Pontoon; these *red* and *green* Lts. in line lead E. of Melampus.
,, **Sutton Pool** -	- -	- -	- -	*Fixed white* Lt. (gas) from W. pier-hd.
Start Lt.-ho. (*white*), at 140 yds. inside S.E. extreme of Start Pt.	92	204	20	*Fixed white* Lt. of the 1st Order, varied *every minute* by a brilliant *flash*. Visible seaward when bearing from S.W. ½ W. (round by W. and N.) to East. *Within* 10 m. a faint continuous Lt. is seen.
,, ,,	- -	192	- -	A *Fixed white* Lt. is placed 12 ft. *below* the above Lt. It is visible in the direction of Berry Hd., or when Start bears from W. ½ S. to S.W. by S. Its W. limit leads between Skerries and the land; its other limit passes over S. end of Skerries. A bell is *struck* 48 *strokes* in a minute in foggy weather.
Dartmouth Lt.-ho. (*white*), on N., or Kingswear, side of harbour, 50 yds. S. of Beacon-hill house.	36	85	11	*Fixed* Lt. of 4th Order, which shows *white* over Fairway channel towards entrance of harbour, between bearings of N. ⅜ W. and N. by W. ¼ W.—shows *red* over Castle ledge and dangers off Kettle Pt., or from N. by W. ¼ W. until masked by land on east side of entrance—and shows *green* over Pin and Checkstone rocks, or from N. ⅜ W. until masked by land on west side of entrance.
,, from flagstaff at 110 ft. seaward of the above Lt.-ho.	- -	70	- -	*Fixed white leading* Lt., which kept in line with the above *white* Lt., N. ¾ W., leads in middle of Fairway towards entrance.
,, near coast-guard station, at S. part of town.	- -	- -	- -	A small *Fixed* Lt., which shows *white* in Fairway towards the town —*red* between Fairway and north shore—and *green* between Fairway and south shore. The white Lt. will not be seen in entering until Gun Pt. shoal can be cleared.
Torbay, harbour Lts.	- -	- -	each 5	*Fixed red* Lt., from Brixham W. pier-hd.—*Fixed red* Lt., from Torquay E. pier-hd. of outer harbour.
Teignmouth Lt.-ho. (*white*), on S.W. end of Denn.	37	34	6	*Fixed red* Lt. This Lt. in one with small *shifting red* Lt. in house behind it leads up to Fairway.

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather.*	Character of Light.
	ft.	ft.	miles. each	
Lyme Regis - -	- -	- -	4	*Two Fixed red* Lts. (see page 37).
Portland Lt.-houses (*white*), 503 yards apart, N.W. by N. and S.E. by S., about ½ m. within the Bill.				
High Lt.-ho. - -	50	210	21	*Fixed white* Lt. of 1st Order.
Low Lt.-ho. - -	85	136	18	*Fixed white* Lt. of 1st Order. The two Lts. in line, N.W. by N., lead between Race and Shambles. The Low Lt. is only visible seaward between the bearings of S.E. by E. ¾ E. and W.S.W.; on all other bearings it is hidden by higher land.
„ **Breakwater**	- -	50	10	*Fixed red* Lt. on outer ring of Fort, at N.E. extreme of Portland Breakwater.
Shambles Lt.-vessel in 15 fms., off E. end of shoal. Has *one* mast.	- -	38	10	*Fixed white* Lt. *Marks:*—Wyke Regis ch. tower appears halfway from the low N.E. Pt. of Portland to W. pier-hd. of Breakwater, N.N.W. ¼ W.—A small white ho. on beach at Church cove is between two windmills at Portland, N.W.—Portland Bill W.N.W.—St. Albans Hd. E. ¼ S. 11 m—Breakwater Lt. N. by W. ¼ W., 5¼ m.
Weymouth - -	- -	30 20	- -	*Two Fixed red* Lts. at N. part of town. *Two Fixed green* Lts. on N. pier (see page 43).
		High Lt.	each	
Poole, from lamp-posts 262 yds. apart, N. ⅓ W. and S. ⅓ E., on S. part of North Haven Pt. at entrance.	- -	37 Low Lt. 16	6	*Two Fixed white* Lts. The low Lt. is masked between bearings of N. by. E. ¼ E. and N ½ E.
	white		white Lt.	
Needles Lt.-ho., on outer Needle rock.	109	80	14 red Lt. 9	*Fixed* Lt. of 1st Order. Shows *red* seaward when bearing from N.W. ¼ N. (round northerly) to E. ¼ N.—Shows *white* from E. ¼ N. to E. by S. ¾ S., or in direction of entrance of Needles channel.—Shows *red* landward towards Poole and Christchurch Bays and over Shingles, or from E. by S. ¾ S. (round southerly) to

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather.*	Character of Light.
	ft.	ft.	miles.	
Needles, *continued.*				S.W. $\frac{3}{4}$ W. There is also a *ray* of *white* Lt., between bearings of S.W. $\frac{3}{4}$ W. and S.W. by W. $\frac{1}{4}$ W., to clear Warden ledge (see plates 8 and 9, and page 53). A bell is sounded in foggy weather.
Hurst Lts. 669 ft. apart, N.E. by E. $\frac{1}{4}$ E. and S.W. by W. $\frac{1}{4}$ W., on Hurst Pt.				
High Lt.-ho. (white)	85	76	13	*Fixed white* Lt. Illuminated arc to seaward from S.W. $\frac{1}{2}$ W. to W. by S. $\frac{1}{2}$ S.—Illuminated arc up the Solent from E. by N. to E $\frac{1}{3}$ S.
Low Lt.-ho. is in the fort, the red top alone being visible; but the front or sea-face of the fort is painted red, which (with the Lts. in line) fits under the top of the low Lt.-ho., and apparently renders the building complete.	52	46	10	*Fixed white* Lt.
Yarmouth - -	- -	12	- -	*Two Fixed* (gas) Lts. 30 yds. apart —the outer one *green* from lamp-post on quay—the inner one *white* from corner of a house.
Calshot Lt.-vessel, in $5\frac{3}{4}$ fms. at entrance of Southampton Water. Has *one* mast.	- -	31	9	*White* Lt., which *revolves* every *minute.* Bursledon mill on with W. end of farm ho. near Hook, N. $\frac{1}{2}$ E.—Nelson monument on with a remarkable tree, E. $\frac{1}{2}$ N.—Gilkicker Pt., S.E., $5\frac{6}{10}$ m.—Hill Hd. buoy, S.S.E., $\frac{7}{10}$ m.—Calshot castle buoy, N.W., $\frac{7}{10}$ m.—Southampton pier-hd., N.N.W., 7 m.—Calshot Spit buoy, W. by S., $\frac{7}{10}$ m. Thorn Knoll buoy, S.W. by W. $\frac{1}{2}$ W., $1\frac{4}{10}$ m.—N.W. Bramble buoy, S.W. $\frac{1}{2}$ W., $1\frac{4}{10}$ m.
Southampton - -	- -	- -	- -	Two *Fixed* Lts. on dock pier-hds., *dark red* on N. pier-hd., *red* on S. pier-hd.; when in one, N.N.E. $\frac{3}{4}$ E., they lead up the Itchen. *Two Fixed* Lts. (one *red*, the other *white*), 15 yds. apart, on end of Royal pier; in one they lead through the channel up to the pier.
Ryde - - - -	- -	21	7	*Fixed white* Lt. on end of old pier.

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather*.	Character of Light.
	ft.	ft.	miles.	
Stokes Bay - -	- -	- -	- -	*Red* Lt. on lamp-post at E. and at W. end of pier; and a centre *red* Lt. is also shown when the steamer is expected.
Southsea Beach, from small turret in N. corner of Southsea castle.	- -	51	9	*Fixed* Lt., which shows *bright red* in channel between Spit Refuge buoy and Horse fort (or between bearings of N. by E. and N.E. by N.), but shows *green* westward of Spit buoy (or between N.E. by N. and E. ¼ N.). Coming from the E. it will be first seen *faint red*, bearing N. by E.; kept on this bearing, it will lead about 4 cables W. of Horse fort and nearly hit Boyne buoy.
,, ,,	- -	- -	- -	*Two Fixed red* (gas) Lts., one at each outer end of Clarence Esplanade pier; *Fixed green* Lt. at N. outer end, and *Fixed red* Lt. at S. outer end, of Victoria pier.
Spithead, temporary *fixed* Lts. on forts building at, and in vicinity of, Spithead.				
,, on fort at entrance of Brading Haven.	- -	38	- -	*Green* Lt.
,, on fort on No-mans Land shoal.	- -	38	- -	*Red* Lt.
,, on fort on Horse sand.	- -	34	- -	*White* Lt.
,, on fort on Spit sand	- -	34	- -	*White* Lt.
Warner Lt.-vessel, in 13 fms. on E. side of Warner bank. Has *one* mast.	- -	38	8	*White* Lt., which *revolves* every *minute*. *Marks*:—St. Helens water-mill ½ its breadth open of St. Helens Seamark, S.W. by W. ¼ W.—Outer end of Ryde pier seen between the towers of Osborne, N.W. by W. ¼ W.—No-man's Land fort, N.W. ½ N., 1¼ m.—Horse fort, N. by E., 1¼ m.—Horse Elbow buoy, N.E. by N., ⅔ m.—Dean Tail buoy, S.E. by E. ½ E., 3 m.—Nab Lt., S.E. ½ S., 3 m.
Nab Lt.-vessel, in 5¼ fms., on outer edge of the most eastern of the shoal patches, 3 m. E. of Bembridge Pt. Has *two* masts 54 ft. apart.	- -	main 38 fore 28	8 6	*Two Fixed white* Lts. of unequal heights. *Marks*:—Portsmouth ch. tower on with Lt. in Southsea castle, N. by W. ½ W.—Kickergill tower on with E. end of Monkton fort, N.N.W. ½ W.—N. tower of Osborne just open of easternmost

Name, Colour, and Position of Light-house..	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather.*	Character of Light.
	ft.	ft.	miles.	
Nab, *continued.*				trees near Ryde, N.W. $\frac{3}{4}$ W.—S.E. Princessa buoy, S.W. $\frac{1}{2}$ W., $2\frac{6}{10}$ m.—Bembridge buoy, W. $\frac{3}{4}$ S., $2\frac{3}{10}$ m.—Nab buoy, W. by S., $1\frac{1}{2}$ m.—Horse Elbow buoy, N.N.W. $\frac{1}{2}$ W., $3\frac{1}{3}$ m.—Dean Tail buoy, N.E. $\frac{3}{4}$ N., $1\frac{1}{4}$ m.—Owers Lt., S.E. $\frac{3}{4}$ E., $12\frac{3}{4}$ m.—Bullock Patch buoy, S.E. by E. $\frac{1}{2}$ E., $3\frac{1}{10}$ m.
St. Catherine Lt.-ho. (*white*), on St. Catherine Pt.	122	178	19	*Fixed white* Lt. of 1st Order. A powerful fog horn is sounded in foggy weather (see p. 46).
Owers Lt.-vessel, in 19 fms., at $\frac{1}{2}$ m. S.S.E. from Elbow of Outer Owers. Has *one* mast. A powerful Fog Horn is sounded in foggy weather; giving forth *six blasts every minute.*	- -	38	10	*Revolving* Lt., showing *white* and *red flashes* at intervals of *half a minute,* in the order of *two white* and *one red. Marks:*—The E. end of plantation on Bow hill in line with Pagham ch., N. $\frac{1}{4}$ W.—A white mill in line with W. end of Selsea Bill, N.N.W. $\frac{1}{4}$ W.—Owers Middle buoy, N.W. $\frac{1}{2}$ N. $3\frac{3}{10}$ m.—Eastborough Hd. buoy, N.N.E. $\frac{1}{4}$ E., $2\frac{3}{4}$ m.—Shelly buoy, N.E. $\frac{3}{4}$ N., $7\frac{3}{10}$ m.—Winter buoy, N.E. $\frac{1}{4}$ E., $8\frac{1}{4}$ m.—Boulder buoy, N.W. $\frac{3}{4}$ W., $6\frac{4}{10}$ m.
Little Hampton -	- -	30	6	*Fixed red* Lt. (all night) on N. end of E. pier. *Tide* Lts. on S. end of E. pier (see p. 72).
Worthing, on pier end.	- -	22	4	*Fixed* Lt., *green* seaward, and *red* inshore.
Shoreham Light-houses, 250 yds. apart N.N.E. and S.S.W.				
,, High Lt.-house (*stone*) on shore abreast the piers.	38	42	10	*Fixed white* Lt. (all night).
,, Low Lt.-house (*wood*), on apex of middle pier.	5	23	- -	*Tide* Lt. (see p. 73).
Brighton, from chain pier-hd.	22	35	10	*Fixed green* Lt.
,, from new pier-hd., which is 1 m. W. of chain pier-hd.	- -	- - high Lt.	5	*Fixed red* Lt.
Newhaven, two Lt.-	35	30	10	*Two Fixed* Lts. High Lt. is *white,*

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather*.	Character of Light.
	ft.	ft.	miles.	
Newhaven, *contd.* houses (*wood*), 50 yds. apart, N. ¼ W. and S. ¼ E., on middle of W. pier.		low Lt. 17	7	and shows *all night*.—Low Lt. is *tidal* (see p. 75).
„ Lt.-ho. on middle of E. pier.	- -	18	3	*Fixed green* Lt. (all night).
Beachy Hd. Lt.-ho. (*white*), on summit of 2nd cliff W. of Hd.	47	285	23	*White* Lt., which *revolves* once every *two minutes* (brilliancy 15 s., darkness 1 m. 45 s.). Coming from the E. it opens out on a N.W. ¾ W. bearing, which leads 1 m. outside Southern Hd.
Eastbourne pier-hd.	- -	- - upper Lt.	2	*Fixed white* Lt.
Hastings - - -	- -	180 lower Lt.	12	*Two Fixed* Lts., 300 yds. apart N.N.E. and S.S.W.—Upper Lt. *white* from building on W. side of hill above the town.—Lower Lt.
		30	5	*red* from building near fish-market on beach.
„ pier, on top of pavilion, at 72 ft. within pier-hd.	- -	40	4	*Fixed green* Lt.
Rye - - - - -	- -	- -	- -	*Tide* Lts. (see p. 78).
Dungeness Lt.-ho. (coloured *red and white in alternate horizontal bands*), stands 422 yds. W.N.W. of Dungeness extreme Pt.	92	107	15	*Fixed white* (electric) Lt. of the 1st Order.—The electric Lt. is coloured *red* between the bearings of S.W. by W. ½ W. and S.W. ½ S., *to mark the anchoring ground on E. side* of Dungeness; from the latter bearing the Lt. is obscured to the land. A *red* Lt. is also shown from a window below the lantern, between the bearing of E. and the land, *to mark the anchoring ground on W. side* of Dungeness: this Lt. is distinct from the electric Lt., which shows *white* in that direction. A powerful Foghorn is sounded in foggy weather (see p. 79).
Varne Lt.-vessel, in 15 fms., about 1 m. W. by N. ½ N. from the depth of 7 fms. on S.W. end of the shoal. Has *one* mast.	- -	38	10	*Revolving red* Lt., which attains its greatest brilliancy every *twenty seconds*. *Marks:*—Dungeness Lt., W. by N. ¼ N., 11¾ m.—Folkestone ch., N., westerly, 9 m.—South Foreland high Lt., N.E. ⅔ N., 12½ m.—N.E. Varne buoy, N.E. by E. ¼ E., 5¾ m.—Cape Gris-Nez Lt., S.E. ⅓ E., 12½ m.

Name, Colour, and Position of Light-house.	Height of Lt-ho. from base to vane.	Height of Lts. above H. W. sps.	Distance seen in *clear weather.*	Character of Light.
	ft.	ft.	miles.	
Folkestone Lt.-ho., on S. pier-hd.	26	37	6	*Tide* Lt. (see p. 81).
„ Lt.-bo. on extreme end of new pier.	- -	31	6	*Fixed* Lt. *all night* (see p. 81).
Dover - - -	- -	- -	- -	*Tide* Lt. (see p. 82). *Fixed green* Lt. (*all night*) from cross-wall near clock-house. *Fixed blue* Lt. (*all night*) from extreme end of Admiralty pier.
South Foreland Lt.-houses, 449 yds. apart W. ¾ N. and E. ¾ S., on summit of cliff.				
High or W. Lt.-ho. (*white, square.*)	69	372	26	*Fixed white* electric Lt. of great brilliancy.
Low or E. Lt.-ho. (*white, octagonal.*)	49	275	23	*Fixed white* electric Lt. of great brilliancy. The Lts. in one, W. ¾ N., lead direct for S. Sand Hd. Lt., and 1 m. S. of Goodwin Sands. The Low Lt. is not visible at anchorage in Downs; and the High Lt. is not visible to the S. of a S.W. ½ S. bearing.
Deal, from pier-end.	- -	- -	- -	*Fixed red* Lt.
South Sand Hd. Lt.-vessel, in 14 fms., S.W. ½ W., 1 1/10 m. from depth of 5 fms. on S. extreme of S. Goodwin. Has *one* mast.	- -	38	10	*Fixed white* Lt. *Marks:*—S. Foreland Lts. in one, W. ¾ N., 3¼ m.—Walmer castle, N. by W. ¾ W. 3¾ m.—Gull Lt., N.N.E., 7 m. (which bearing will lead 1 cable inside or E. of Bunt Hd. buoy, distant 4 6/10 m.).—Deal Bank buoy N. ¼ E., 4¾ m.
East Goodwin Lt.-vessel, in 27 fms., E.S.E., 1 1/10 m. from S.E. Goodwin buoy, and 1½ m. from S.E. edge of Goodwin Sand. Has *one* mast. A *Large Diamond* at Mast Hd. The *Lantern* will also be *usually* at Mast Hd.	- -	38	10	*Revolving Green* Lt., showing a *flash* at intervals of *fifteen seconds. Marks:*—S. Sand Hd. Lt. W. by S. ½ S., 6 6/10 m.—N. Sand Hd. Lts. N. by E. ¼ E., 6½ m.—Deal ch. on with N. end of Deal Hospital, W. by N. ¾ N.—Goodwin Beacon N.N.W. ¼ W., 2¼ m.
Gull Stream Lt.-vessel, in 8 fms., in the middle of the Gull stream. Has *one* mast.	- -	36	7	*Revolving white* Lt., which shows its greatest brilliancy every *twenty seconds. Marks:*—S. Foreland high Lt. over middle of Old Stairs bay, S.W.—Ash ch. ⅓ from St. Peters ch. towards St. Clements ch. at Sandwich, N.W. by W. ¾ W.—N. Sand Hd. Lts. E. by N. ¾ N., 5 6/10 m.

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather*.	Character of Light.
	ft.	ft.	miles.	
Goodwin, or North Sand Hd. Lt.-vessel, in 10 fms., about 1 m. E. 5 fms. on north extreme of Goodwin knoll. Has *three* masts.	- -	fore 28 main 42 mizen 28	10	*Three Fixed white* Lts., forming a *triangle*, one light on each mast. *Marks:*—North Down monument in line with Redding Street Beacon, N.W.—S. Foreland low Lt.-ho. just showing clear of N. Pt. of St. Margaret bay, S.W. ¾ W.—Ramsgate pier Lt., W. by N. ¾ N.—N. Foreland Lt., N.W. ¼ N. 6 m.—Kentish knock Lt.-vessel (*revolving* Lt.), N.N.E. ½ E., 21 m.—Galloper Lt.-vessel (two *Fixed horizontal* Lts.), N.E. 28½ m.
Ramsgate, from iron pillar on E. pier of harbour.	12	25	5	*Flashing white* Lt., at *equal* intervals of *five seconds* light and *five seconds* dark. It illumines an arc of 224°, or from the direction of the Dike buoy (round south), to the centre of the basin-gates of W. entrance of inner harbour.
„ Lt.-ho. (*granite*) on W. pier-hd.	37	38	7	Tide Lt., all night—*green* when less than 10 ft. at entrance, and *red* when more than 10 ft. (see p. 88).
North Foreland Lt.-ho. (*white, octagonal*), on rising ground 300 yds. within edge of cliff.	78	184	19	*Fixed white* Lt. of 1st Order. A *red ray* of Lt. is thrown between N. by W. ¾ W. and N. ¾ E. bearings from Lt.-ho. (or from Tongue Lt.-vessel to 1 cable E. of E. buoy of Margate sand), to enable vessels to keep E. of Margate sand.
		FRENCH COAST.		
Ushant N.E. Lt.-ho. (*two towers united*), near N.E. extreme of island.	85	272	18	*Fixed white* Lt. of 1st Order.
„ N.W. Lt.-hŏ. (*circular tower, black and white horizontal stripes*), on N.W. extreme of island.	154	223	24	*Revolving* Lt. of 1st Order, showing successively *two white* faces and *one red* face at intervals of *twenty seconds*. A fog trumpet is sounded in foggy weather from N.W. end of island, for about two seconds, at intervals of ten seconds.
Les Roche Douvres Lt.-ho. (iron, white), on plateau.	148	180	16	*Flashing* Lt. of 1st Order, which shows a *white flash* every *four seconds*. A bell is sounded at intervals of *three seconds* in foggy weather.

Name, Colour, and Position of Light-house.	Height of Lt.-ho. from base to vane.	Height of Lts. above H.W. sps.	Distance seen in *clear weather.*	Character of Light.
	ft.	ft. each	miles. each	
Casquets, *three* (*white*) Lt.-houses on N. islet, 100 ft. above H.W.	45 68 68	113	15	*Three revolving* Lts. of 1st Order, each eclipsed at intervals of *twenty seconds.* The Lt.-houses are in triangular position with respect to each other, thus :—From south-east to north-west Lt.-ho., N.W. ¾ W., 24 yds.; from north-west to north-east Lt.-ho., E. ¾ N., 62 yds.; from north-east to south-east Lt.-ho., S.W. ½ W., 46 yds.—The three Lts. will consequently appear as *two* when viewed in either of those three (or in the opposite) directions. A bell is sounded in foggy weather.
Hanois Lt.-ho. (*gray granite*), on S.W. rock of Hanois group, 1 m. off W. end of Guernsey.	117	100	13	*Revolving red* Lt. of 1st Order, which attains its greatest brilliancy every *forty-five seconds.* Obscured to the eastward by Guernsey between bearings of W. by S. and N.W. The Casquets bear N.E. by E. 21¼ m. A bell is struck *seven strokes in a minute* at equal intervals in foggy weather.
Cape Barfleur Lt.-ho. (*circular*), on extreme of Cape.	236	233	22	*Revolving white* Lt. of 1st Order, which attains its greatest brilliancy every *half-minute.* The eclipses are not total to a vessel within 12 m. of Lt.
Cape la Hague Lt.-ho. (*circular*), on Gros du Raz rock, W. ½ S., ½ m. from Cape.	- -	154	20	*Fixed white* Lt. of 1st Order.
	each	each	each	
Cape de la Heve, two Lt.-houses (*white, square*), 106 yds. apart, N.E. ½ N. and S.W. ½ S., not far from edge of cliff.	66	397	27	*Two Fixed white* (electric) Lts. of 1st Order, the intensity of which will be doubled in thick fogs.
Cape Alprech Lt.-ho. (*square*), on summit of Cape, 87 yds. from edge of cliff.	33	161	12	*Fixed white* Lt. of 3rd Order, varied every *two minutes* by a *red flash,* which is preceded and followed by a short eclipse.
Cape Gris-Nez Lt.-ho. (*circular*), on S.W. extreme of small spot of level land ¼ m. S. of Cape and ½ cable from edge of cliff.	79	226	25	*Revolving white* (electric) Lt. of 1st Order, the eclipses of which succeed each other every *half-minute,* but are not total to a vessel within 12 m. of Lt.*

* Remember that the *fixed white* Lt. at Calais is varied every *four minutes* by a *white flash*—and that the *fixed white* Lt. at Cape Alprech is varied every *two minutes* by a *red flash.*

DESCRIPTION OF AND MARKS FOR BUOYS.

Name, Colour, and Position of Buoy.	Marks.
RUNNEL STONE buoy, *black* (bell buoy with *staff* and *ball*), in 22 fms., at 1½ cables S.W. from the rock.	The upper or N. beacon on land abreast, just open W. of lower beacon, N. by E. ¼ E. The N. high part of Trigoning hill in line with Tetterdu Pt., E. ½ N.—Longships (*red*) Lt., N.N.W., 4 m.—Wolf Rock Lt., W. by S. ¾ S., 6¾ m.—Lizard Lts., S.E. by E., southerly, 18½ m.
MOUNTS BAY.	
LOW LEE buoy, *red*, in 7 fms., on E. side of the rock.	Extreme cliff at Penzer Pt. on with N. hummock of St. Clements Id., S.W. ¾ W.—St. Pauls ch. tower on with S. new barn, W. by N. ½ N.
GEAR ROCK buoy, *black* (nun), in 3 fms.	Gear rock, N.W., distant 30 fms.
MOUNTAMOPUS buoy, *black*, in 6 fms., on S. edge of the shoal.	Acton castle on with the hummock on Cuddan Pt. N.E. ¾ N.—Pengersick castle on with the extreme of Hoe Pt., E. by N.
MANACLES buoy, *black* (bell buoy with *staff* and *ball*), in 22 fms., at 100 yds. S.E. from the Penwin rock.	Black Head, S.W. by W. ¾ W., 3$\frac{6}{10}$ m.—St. Keverne ch. spire, N.W. by W. ¾ W.—Mawnan ch. tower touching first rise of land of Nare point, N. by W.—St. Anthonys Lt.-ho., N.N.E. ¾ E., 5$\frac{6}{10}$ m.
FALMOUTH.	
LUGO buoy, *black*, 50 yds. S. of rock.	St. Mawes castle, N.N.E., distant 1¾ cables.
GOVERNOR ROCK buoy, *chequered black* and *white* (can), in 15 ft., at 60 yds. E. by S. from rock.	Manacle Pt. touching block-ho. on Pendennis Pt., S.S.W. ¾ W.—Fish cellars at Polvarth, touching sea-wall of St. Mawes castle, E. by S.—Flushing pier-hd. touching E. end of Falmouth dock breakwater, N.W. ¼ N.—Black rock beacon, S. ¼ E., ½ m.—St. Anthony Lt.-ho., S.S.E. ¾ E., 1$\frac{1}{10}$ m.
NARROWS—*black* buoy on edge of St. Mawes bank on E. side of Narrows; and *white* buoy on edge of Falmouth bank on W. side of Narrows. There is a *black* buoy (the Vilt) on N.W. prong of St. Mawes bank, which is steep-to.	
PLYMOUTH SOUND.	
DRAYSTONE buoy, *chequered red* and *white* (conical), in 5 fms., on outer extreme of Draystone reef, 2 cables S.S.E. from Penlee Pt.	Cavchole cellar (or third fish store) in Cawsand bay on with H.W. mark at Penlee Pt., N. ¼ E.—Breakwater beacon on with S. angle of new redoubt on Staddon heights, E. by N.—Knap buoy, E. by N. ¾ N., 1$\frac{1}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
KNAP buoy, *black* (conical), in 6 fms., on S. end of shoal.	Breakwater Lt. on with sharp angle next west of Citadel Gateway, N.E.—Bolt Tail touching H.W. mark on N. side of Mewstone, S.E. $\frac{1}{2}$ S.—Panther buoy N.E. by E. $\frac{1}{2}$ E., $\frac{4}{10}$ m.
PANTHER buoy, *black*, in 6 fms., near N. end of shoal.	St. Aubyns ch. tower on with W. extreme of Breakwater platform, N. $\frac{3}{4}$ E.—Highest part of Reny rocks just open of Yealm Pt., S.E. $\frac{3}{4}$ S.
MEWSTONE LEDGE buoy, *red* (conical) in $7\frac{1}{4}$ fms., near S.W. extreme of the ledge.	Peaks of Great and Little Mewstones in line, E.N.E.—Picklecombe fort just open N. of Breakwater Lt., N.N.W.—Knap buoy N.W. by N., $2\frac{4}{10}$ m.—E. Tinker buoy, N.N.W., $1\frac{4}{10}$ m.
W. TINKER buoy, *white*, in 6 fms., at W. extreme of shoal.	Mount Wise flagstaff on with cupola of St. Johns ch., N. $\frac{1}{4}$ W.—Penlee Pt. on with dark square spot in valley N. of Rame Hd., W. by N. $\frac{3}{4}$ N.—E. Tinker buoy, S.E. $\frac{3}{4}$ E., $\frac{2}{10}$ m.—Knap buoy, N.W., $\frac{8}{10}$ m.
E. TINKER buoy, *white*, in 5 fms., at E. extreme of shoal.	N. end of Shagstone touching the cliff on Warren Pt., S.E. $\frac{1}{4}$ E.—St. Stephens ch. spire (near Mt. Wise) touching W. end of Round fort near Breakwater, N. $\frac{1}{4}$ E.
EAST CHANNEL—*chequered black* and *white* buoy, in $4\frac{1}{4}$ fms., on Outer or S. rocky patch in mid-channel.	Inner edge of Shagstone on with peak of Little Mewstone, S. by E. $\frac{3}{4}$ E.—Breakwater beacon on with doorway at E. part of Citadel, immediately under highest building in Citadel, N. by E. $\frac{3}{4}$ E.
EAST CHANNEL—*chequered black* and *white* buoy, in $4\frac{1}{4}$ fms., on Inner rocky patch in mid-channel.	Breakwater beacon in line with citadel flagstaff, N.N.E.—Breakwater Lt. on with gamekeeper's cottage, Mount Edgecumbe, N.W. $\frac{3}{4}$ N.
EAST CHANNEL—*red*, Outer or S. buoy, in 4 fms., on E. side of channel.	Shagstone on with peak of Great Mewstone, S.S.E. $\frac{1}{2}$ E.—Breakwater beacon on with E. end of row of small houses over Stonehouse quarry, N. by E.
EAST CHANNEL—*red*, Inner or N. buoy, in $4\frac{1}{4}$ fms., on E. side of channel.	Ruin on Rame Hd. on with first hollow in cliff N. of Penlee Pt., W. by N.—St. Aubyns ch. tower on with W. high chimney in Victualling yard, N. $\frac{1}{2}$ W.
DUKE ROCK buoy, *white*, in 5 fms., on W. edge of shoal.	Reny Pt. and top of Mewstone in line, S. $\frac{3}{4}$ E.—Obelisk on the Hoe on with Diamond mark on rock under the Hoe, N. by E. $\frac{1}{2}$ E.—Bovisand pier-hd., S.E. $\frac{1}{2}$ E., $\frac{1}{3}$ m.—Breakwater beacon, S.S.W. $\frac{1}{2}$ W., $\frac{1}{3}$ m.
QUEEN'S GROUNDS buoy, *red*, in 5 fms., on S.E. extreme.	Block-ho, on Devil's Pt. on with H.W. mark at Redding Pt., N. by E. $\frac{3}{4}$ E.—Peak of Great Mewstone on with W. crane of breakwater, S.S.E. $\frac{1}{2}$ E.
NEW GROUNDS buoy, *red*, in $5\frac{1}{4}$ fms., near shoalest part of 29 ft.	Tall chimney of engine-house in dockyard just open of Wilderness H.W. Pt., N. $\frac{3}{4}$ W.—St. Johns ch. spire, Plymouth, on with lower part of retreating angle in Citadel wall, just within Fisher's Nose, N.E. $\frac{1}{2}$ E.

Name, Colour, and Position of Buoy.	Marks.
MELAMPUS buoy, *black*, in 4 fms., on S.E. extreme of Drakes island ledge.	St. Andrews ch. tower, Plymouth, its breadth open W. of Obelisk on Hoe, N.E. by N.—Turret of St. John's chapel and Victualling yard gate bell in line, N.N.W. ¼ W.—Asia buoy, N. by E., $\frac{4}{10}$ m.
ASIA buoy, *white*, in 21 ft. on N.E. extreme of Drakes island ledge.	Camera on the Hoe on with S.E. angle of Esplanade terrace, N.E. ¼ N.—Gill's soap factory on with Rusty Anchor Pt., N. ¼ E.
WINTER N.W. buoy, *striped red* and *white*, in 4 fms., on N.W. edge of the shoal.	Gill's soap factory chimney on with N.E. angle of W. Hoe terrace, N. ¾ W.—Mount Edgecumbe ruin in line with S. end of barracks on Drakes island, W. ¼ S.
WINTER N.E. buoy, *chequered red* and *white*, in 5 fms., on N.E. edge of the shoal.	Gill's soap factory chimney over E. end of lime-kilns in W. Hoe quarry, N. by W. ¾ W.—Half of Cawsand coast-guard open of Redding Pt., W. by S. ½ S.
WINTER S. buoy, *red*, in 3 fms., on S. edge of the shoal.	N. end of Cawsand coast-guard touching Redding Pt., W. by S. ¼ S.—Obelisk at Cremill Pt. on with end of grass on Bottlenose Pt., N.W. by W. ¾ W.
MALLARD buoy, *black*, in 7 fms., on N.W. extreme of the shoal.	Cawsand coast-guard just in sight over Redding Pt., W. by S ½ S.—Obelisk on Mount Edgcumbe on with second embrasure in Western King fort, W.N.W.—The Mallard, Melampus, and New Ground buoys and Breakwater Lt. are in line, S.W. ¼ W.
COBBLER buoy, *black*, in 2½ fms., on W. edge of the ledge.	Devonport monument on with W. Hoe terrace Pt., N.W.—The southernmost of two tall chimneys at Catdown, its own breadth open of quay on Mount Batten Pt. E. ¼ N.
THE BRIDGE has 2 small *beacon* buoys to mark the deepest water over it. The S. or outer one is *red*, the inner one *white*.	The buoys lie in 3 fms. on outer and inner part of the Bridge reef, but there is only 7 feet at at L.W. sps. on the middle part of the reef.
DRAKES ISLAND N.W. SPIT buoy, *black* (can), in 10 fms.	Mount Edgcumbe Obelisk on with end of wall at Wilderness Pt., N.W. by W. ¼ W.—E. end of Esplanade terrace on with centre of W. Hoe terrace, E. by N. ½ N.
VANGUARD buoy, *black* (moorings), in 5 fms., on S. side of the rock.	St. John's chapel cupola on with W. side of Block-ho. at Devils Pt., N. ½ W.—S. chimney in Victualling yard on with centre brick embrasure in Western King fort.
CREMILL buoy, *black* (conical), on N.E. extreme of the shoal.	
RUBBLE buoy, *black*, on W. end of the bank.	

Name, Colour, and Position of Buoy.	Marks.
	DARTMOUTH.
HOMESTONE buoy, *black* and *white horizontal stripes*, in 7 fms., $\frac{1}{2}$ cable S.E. of rocks.	Castle Ledge buoy, N.E. by E. $\frac{1}{2}$ E., $5\frac{1}{4}$ cables.
CHECKSTONE buoy, *chequered black* and *white*, in $3\frac{3}{4}$ fms., distant 25 fms. S.E. of the rock.	Castle Ledge buoy, S.S.E., $6\frac{1}{4}$ cables.
CASTLE LEDGE buoy, *black*, in $4\frac{1}{2}$ fms., at $\frac{1}{2}$ cable outside the ledge.	
PEVEREL LEDGE buoy, *black* (conical), in $5\frac{1}{2}$ fms., on outer extreme of ledge.	Old Harry, N.E. by N.——Swanage battery on Peverel Pt., W.N.W.—Durlston Hd., S.W. by W.
CHRISTCHURCH LEDGE buoy, *black*, in 3 fms., on *middle* of the ledge.	Christchurch Hd., N. by W. $\frac{3}{4}$ W., $1\frac{1}{4}$ m.—S.E. extreme of ledge, S.E. $\frac{3}{4}$ S., $1\frac{1}{2}$ m.
	NEEDLES AND SOLENT CHANNELS TO SPITHEAD.
SHINGLES S.W. buoy, *chequered red* and *white* (conical), in 7 fms., off S.W. prong of Shingles.	Hurst high Lt.-ho. its breadth open N. of low Lt.-ho., N.E. by E. $\frac{3}{4}$ E.—Nodes Beacon on with S. part of variegated cliff in Alum bay, E. by S. $\frac{3}{4}$ S.—Elbow buoy, N.E. by E. $\frac{3}{4}$ E., $1\frac{3}{10}$ m.—Warden Ledge buoy, E. by N. $\frac{1}{4}$ N., $2\frac{9}{10}$ m.—Needles Lt.-ho., S.E. by E., $\frac{8}{10}$ m.—Christchurch Ledge buoy, N.W. $4\frac{3}{4}$ m.
SHINGLES Elbow buoy, *striped red* and *white vertically* (can), in 7 fms., close to Elbow of Shingles.	Hurst high Lt.-ho., its apparent breadth and a half open N. of low Lt.-ho. N.E. by E. $\frac{3}{4}$ E.—S. end of ho. with a chimney at each end (next Warden battery), touching N. end of Golden Hill fort, E. by S.—N.E. Shingles buoy, N.E. by E. $\frac{3}{4}$ E., $1\frac{1}{2}$ m.—Warden Ledge buoy, E. $\frac{1}{2}$ N., $1\frac{7}{10}$ m.—Needles Lt.-ho. S.S.W. $\frac{1}{2}$ W., $1\frac{1}{6}$ m.
SHINGLES N.E. buoy, *striped red* and *white horizontally* (can), in 7 fms., near N.E. extreme of Shingles.	W. end of small grove of trees on the down, open W. of Heathfield ho., S.E.—Easternmost of 3 remarkable trees in New forest on with end of Hurst beach, N.E. by E. $\frac{1}{2}$ E.—Warden Ledge buoy, S.E. $\frac{1}{2}$ S., $\frac{1}{2}$ m.—Needles Lt.-ho., S.W. $\frac{1}{4}$ W., $2\frac{1}{2}$ m.—Hurst high Lt.-ho., N.E. by E. $\frac{1}{4}$ E., $\frac{3}{4}$ m.
WARDEN LEDGE buoy, *red* (can) in $5\frac{1}{2}$ fms., close to outer edge of the ledge, which is steep-to.	A conspicuous mound on top of Afton down open S. of Nelson hotel, S.E. $\frac{1}{2}$ E.—Flagstaff of Victoria fort on Sconce Pt. just seen over low part of Cliffs-end, E. by N. $\frac{1}{2}$ N.—Needles Lt.-ho., S.W. by W. $\frac{1}{2}$ W., $2\frac{1}{2}$ m.—Hurst low Lt.-ho., N. by E. $\frac{1}{4}$ E., $\frac{8}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
BLACK ROCK buoy, *red* (can), in $10\frac{1}{2}$ fms., a little outside or north of the rock.	W. end of Tapnel farm open of E. end of Sand ho. at Yarmouth bridge, S. by E. $\frac{1}{2}$ E.—End of jetty at Sconce Pt. on with third casemate S. of the flagstaff, W. $\frac{1}{4}$ S.—Lymington Spit buoy, N.N.E. $\frac{1}{2}$ E., $1\frac{1}{3}$ m.—Hampstead Ledge buoy, East, $3\frac{1}{6}$ m.
LYMINGTON SPIT buoy, *chequered red* and *white* (can) in 2 fms., on the spit at W. side of entrance to the river. (Jack-in-the-Basket is a large *ball beacon* within this buoy, on the same side of the entrance).	Hurst low Lt.-ho., on with corner of S. cottage, W. by S. $\frac{3}{4}$ S.—Lymington ch., on with yellow-fronted ho. on beach, N.N.W.—N.E. Shingles buoy just open of Hurst Pt., W.S.W., 3 m.—Hampstead Ledge buoy, E.S.E., $2\frac{8}{10}$ m.
HAMPSTEAD LEDGE buoy, *red* (can) in 5 fms., on N.E. edge of ledge.	A house, with a remarkable tree on the down above it, just open of S. part of Sir Burrard Neale's plantation, W. by S.—The N.E. end of trees on Hampstead Pt., on with N.E. end of Saltern park, S.E. by E.—Salt Mead buoy E. 2 m.
SALT MEAD LEDGES buoy, *red* (can) in 5 fms., on N.E. edge of ledges.	The S. end of Sir Burrard Neale's plantation, on with S. end of the Mead, W. $\frac{3}{4}$ S.—Luttrell tower, just shut in with Stansore Pt., N.E. $\frac{1}{2}$ E.—Gurnet Ledge buoy, E. by N., 2 m.
GURNET LEDGE buoy, *red* (can) in 8 fms., on E. extreme of ledges. It lies 2 cables off shore, at $\frac{2}{3}$ m. N.E. of Gurnet Hd., and W. $\frac{1}{2}$ S., $1\frac{1}{10}$ m. from Egypt Pt.	A house on the back land, in line with W. gable end of a red-tiled roofed cottage, S. by E. $\frac{1}{2}$ E.—A tall chimney in Thorney bay in line with centre of grove of trees, S.W.—N.W. Bramble buoy, N.E. by E. $\frac{1}{4}$ E., $2\frac{1}{2}$ m.—W. Bramble buoy, E.N.E., $2\frac{2}{10}$ m.
LEPE MIDDLE buoy, *striped red and white vertically* (conical) in 4 fms. on edge of the shoal.	Old Castle bathing ho. open of Egypt Pt., S.E. by E. $\frac{3}{4}$ E.—Inner beacon at Lepe, its apparent width E. of Outer beacon, N. by E. $\frac{3}{4}$ E.—Gurnet Ledge buoy, S.E. by S., $1\frac{1}{10}$ m.—Salt Mead buoy, S.W., $1\frac{9}{10}$ m.—Hampstead Ledge buoy, W. by S. $\frac{3}{4}$ S., $3\frac{6}{10}$ m.—Lymington Spit buoy, W., $5\frac{8}{10}$ m.—Thorn Knoll buoy, E. by N., $2\frac{1}{2}$m.—W. Bramble buoy, E., $2\frac{1}{2}$ m.—Prince Consort buoy, E. by S. $\frac{3}{4}$ S., $2\frac{6}{10}$ m.
THORN KNOLL W. buoy, *striped red* and *white horizontally* (can), in $4\frac{1}{2}$ fms., on W. edge of the knoll.	N.W. end of large chalkpit on Portsdown hill in line with N.W. end of Hill Hd. coast-guard, E. $\frac{1}{4}$ N.—Bursledon mill over the middle of second house W. of Calshot castle, N. by E. $\frac{1}{2}$ E.—N.W. Bramble buoy, S.E. by S., $\frac{3}{10}$ m.—W. Bramble buoy, S., $\frac{6}{10}$ m.—Calshot Lt.-vessel, N.E. by E. $\frac{1}{2}$ E., $1\frac{4}{10}$ m.—Thorn knoll N. buoy, N.E. by E. $\frac{1}{2}$ E., $\frac{1}{2}$ m.—Calshot Spit buoy, N.E. $\frac{3}{4}$ E., $\frac{8}{10}$ m.—Gurnet Ledge buoy, S.W. $\frac{3}{4}$ W., $2\frac{1}{2}$ m.—Hampstead Ledge buoy, W. by S. $\frac{1}{2}$ S., $6\frac{2}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
THORN KNOLL, *continued.* —— N. buoy (marked North Thorn), *red* (can), in 3½ fms. on N. edge of knoll.	Nelson monument in line with white ho. amongst trees N. of Hill Hd., E. by N.—E. end of Netley hospital in line with W. end of boat ho. at Calshot castle, N. ½ W.—Calshot Lt.-vessel, N.E. by E. ½ E., 1 m.—Calshot Spit Refuge buoy, N.E. ½ E. $\frac{4}{10}$ m.
BRAMBLE N.W. buoy, *red* (can) in 25 ft., at N.W. angle of bank.	The mill at W. Cowes in line with centre of R. Y. S. Club-house, S.S.W.—Nelson monument, in line with Crahurn farm, E. by N.—Calshot Spit buoy, N.N.E. ¾ E., $\frac{9}{10}$ m.—Calshot Lt.-vessel, N.E. ½ E., $1\frac{4}{10}$ m.—Hill Hd. buoy, E. ¾ N., $1\frac{4}{10}$ m.
BRAMBLE West buoy, *chequered red* and *white*, with staff and *cage* (conical), in 27 ft., at S.W. bank.	Ginns Salterns open of Stone Pt., W.N.W.—Hamble ch. midway between public ho. at Calshot Pt. and the Castle, N. by E.—N.W. Bramble buoy, N.N E., $\frac{4}{10}$ m.—E. Bramble buoy, E. by S. ½ S., 2½m.—W. Middle buoy, S.E., 1½ m.—Old Castle Pt. buoy, S.S.E., $1\frac{3}{10}$ m.—Prince Consort buoy, S. ¼ W., $\frac{5}{6}$ m.
BRAMBLE East buoy, *striped red* and *white vertically* (conical), in 19 ft., on S.E. angle of bank.	W. Cowes mill open W. of Bathing ho., W. by S. ½ S.—Hill Hd buoy on with Calshot castle, N.W. by N., $1\frac{6}{10}$ m.—W. Middle buoy, W. by S. ¼ S., $1\frac{3}{10}$ m.—E. Middle buoy, S. by E. ¾ E., 1½ m.
BRAMBLE N.E. (marked Hill Head) buoy, *red* (conical), in 18 ft.	A house E. of Hamble ch. open of trees at Hook Pt., N. ½ W.—Fareham ch. on with new brick ho. under the cliff at Hill Hd., E.N.E.—N.W. Bramble buoy, W. ¾ S., $1\frac{4}{10}$ m.—Thorn Knoll buoy, W. ¼ N., $1\frac{6}{10}$ m.—Calshot Spit buoy, N.W. by W. ½ W., $1\frac{1}{10}$ m.—Calshot Lt.-vessel N.N.W., $\frac{7}{10}$ m.
CALSHOT SPIT buoy (*black Refuge bell buoy*), in 24 ft., on S.E. edge of spit, 1 m. S. ½ E. from castle, and S. ¾ W., $\frac{7}{10}$ mile from Calshot castle buoy.	A red brick ho. at Hill Hd. in line with W. end of large chalkpit on Portsdown hill, East, northerly.—Railway hotel at Southampton just open E. of the western ho. on Calshot Pt., N. by W.
PRINCE CONSORT buoy, *red* (can), in 4 fms., at 33 yds. N. of a 22-ft. patch.	W. Cowes mill in line with S. corner of Hewitt's bathing-place, S.W. ½ S.—Flagstaff on outer end of Stephen's causeway in line with W. angle of Keane's houses, W. by S. ¼ S.—E. Bramble buoy, E. ¼ N., $2\frac{4}{10}$ m.—W. Middle buoy, E. ¾ S., $1\frac{2}{10}$ m.—Old Castle Pt. buoy, S.E. by E., $\frac{7}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
OLD CASTLE PT. buoy, *red* (can), in 3 fms., at 1½ cables N. of the Pt.	W. Cowes mill open S. of a yellow ho., W. by S. ½ S.—Ryde mill in line with Osborne Pt., S.S.E.—W. Middle buoy, E. by N., $\frac{6}{10}$ m.—E. Middle buoy, E.S.E., $2\frac{6}{10}$ m.—Peel Bank buoy, S.E. ½ E., $2\frac{1}{10}$ m.
RYDE MIDDLE W. buoy, *striped red* and *white horizontally* (can), in 28 ft., at W. end of bank, close westward of a 15 ft. patch.	Asheydown tower, its apparent breadth open W. of a clump of trees near Wootton, S. ½ E.—the Club house at West Cowes Pt., W. ½ S.—E. Middle buoy, S.E. by E., 2½ m.—Peel Bank buoy, S.E. ¾ S., $1\frac{6}{10}$ m.
RYDE MIDDLE E. buoy, *chequered red* and *white* (conical), in 28 ft., at S.E. edge of bank.	Southsea castle just in line with Gilkicker Pt., E. by S. ¼ S.—Asheydown tower in line with a clump of trees, S. by W. ¼ W.—N.E. Middle buoy, N.E. by E. ½ E., $\frac{2}{10}$ m.—Peel buoy, W.S.W., ¾ m.—Calshot Lt.-vessel, N.N.W. ¼ W., $3\frac{8}{10}$ m.—W. Sturbridge buoy, S.E. ½ E., 2¼ m.
RYDE MIDDLE N.E. buoy, *red* (conical with staff and globe), in 4 fms., on N.E. edge of bank.	Southsea castle Lt.-tower just shut in with N.W. angle of Gilkicker fort, E. by S. ¼ S.—Wootton Pt. in line with Ashtake house, S.W. by S.—W. Sturbridge buoy, S.E. ¼ S., $2\frac{2}{10}$ m.—E. Bramble buoy, N.N.W. ½ W., 1½ m.—W. Middle buoy, N.W. by W. ½ W., $2\frac{3}{10}$ m.
PEEL BANK buoy, *red* (can) in 5 fms., on edge of Peel bank, 1 m. off shore.*	Asheydown tower in line with N. end of Wootton coast-guard, S. ¼ W.—Two church spires at Ryde in line, S.E. by S.—W. Sturbridge buoy, S.E. by E. ¾ E., $2\frac{7}{10}$ m.
STURBRIDGE W. buoy, *striped black* and *white horizontally* (can), in 5 fms., on W. extreme of bank.	Nelson monument on with W. end of Anglesea terrace, N.N.E. ½ E.—Flagstaff on end of Ryde pier on with the white Belvidere, S.W.—Calshot Lt.-vessel, N.W. by N., $5\frac{9}{10}$ m.—Outer Spit buoy, E. by S., $2\frac{4}{10}$ m.—E. Sturbridge buoy, S.E. by E., $\frac{7}{10}$ m.
STURBRIDGE E. buoy, *striped black* and *white horizontally* (conical), in 5 fms. on E. extreme of bank.	Tall chimney at Haslar on with centre of Southwick fort on Portsdown hill, N.N.E. ¾ E.—Centre of Spit fort on with E. end of S. Parade, E.N.E.—Outer Spit buoy, East, $1\frac{8}{10}$ m.—Horse Elbow buoy, S.E. by E., $2\frac{7}{10}$ m.—Sand Hd. buoy, S. by E. ¼ E., ½ m. No-mans Land fort, S.E., 1½ m.
RYDE SAND HD. buoy, *chequered black* and *white* (can), in 28 ft. off N.E. edge of Ryde Sand.	Kickergill tower on with centre of the new fort on Gilkicker Pt., N. ¼ E.—Outer end of Ryde pier on with flagstaff on Wootton Pt., W. by N. No-mans Land fort, S.E. by E. ¼ E., 1⅛ m.

* A black mooring buoy is placed off Osborne Royal Hard, and two others off Cowes, between Old Castle Pt. and Prince Consort shoal, for the use of Her Majesty's yachts.

Name, Colour, and Position of Buoy.	Marks.
EASTERN ENTRANCE TO SPITHEAD.	
PRINCESSA N.W. buoy, *striped black* and *white vertically* (can), in 32 ft., close to N.W. edge of shoal.	Sandown fort just open of Culver cliff, W. by N.—Nettlestone Pt. and Bembridge Pt. in line, N. by W. $\frac{1}{3}$ W.—Dunnose, W. by S. $\frac{3}{4}$ S., $6\frac{4}{10}$ m.—Bembridge buoy, N.N.E., nearly 1 m.—Nab Rock buoy, N.E. $\frac{3}{4}$ E., $1\frac{4}{10}$ m.—S.E. Princessa buoy, S.E. $\frac{1}{2}$ E., $\frac{8}{10}$ m.
PRINCESSA S.E. buoy, *chequered black* and *white* (conical, with staff and cage), in 29 ft., on S.E. edge of shoal.	Red clay cliff in Sandown bay just opening of Culver cliff, W. by N. $\frac{1}{2}$ N.—High round tree on St. Helens down in line with flagstaff on Bembridge Pt., N.N.W. $\frac{3}{4}$ W.—Bembridge Ledge buoy, N. by W. $\frac{1}{4}$ W., $1\frac{4}{10}$ m.—Warner Lt.-vessel, North, 4 m.—Nab Lt.-vessel, N.E. $\frac{1}{2}$ E., $2\frac{6}{10}$ m.—Nab Rock buoy, N. by E. $\frac{3}{4}$ E., $1\frac{1}{2}$ m.—Dunnose, W. by S. $\frac{1}{4}$ S., 7 m.—Bullock Patch buoy, E. $\frac{1}{4}$ N., $4\frac{3}{4}$ m.
BEMBRIDGE LEDGE buoy, *chequered black* and *white* (can), in 24 ft., on outer edge of ledge.	Bembridge ch. midway between Lifeboat ho. and the red ho. next W. of it, N.W. by W. $\frac{1}{4}$ W.—Centre of Horse fort on with centre of Southwick fort on Portsdown hill, N. $\frac{3}{4}$ E.—Warner Lt.-vessel, N. $\frac{3}{4}$ E., $2\frac{7}{10}$ m.—Nab rock buoy, E., $\frac{8}{10}$ m.
NAB ROCK buoy, *striped black* and *white horizontally* (can), in $4\frac{3}{4}$ fms., at $\frac{1}{2}$ a cable S.E. of rock.	Asheydown tower midway between Bembridge ch, and the Lifeboat ho., W. by N. $\frac{1}{2}$ N.—The E. end of Eastney barracks on with E. end of Widley fort on Portsdown hill, N. by E.—Nab Lt.-vessel, E. by N., $1\frac{1}{2}$ m.—Warner Lt.-vessel, N. by W., $2\frac{3}{4}$ m.
DEAN TAIL buoy, *black* (conical, with staff and ball), in 30 ft., just outside the depth of 4 fms. It is the S.E. buoy of Horse and Dean sand.	Asheydown tower in line with St. Helens Seamark, W. $\frac{1}{3}$ N.—The E. end of Blockhouse fort just open of Southsea Castle Pt. N.N.W. $\frac{1}{2}$ W.—The Dries buoy, S.E. by E. $\frac{1}{4}$ E., 7 m.—Bullock Patch buoy, S.E. $\frac{1}{2}$ S., $3\frac{2}{10}$ m.—Nab Lt.-vessel, S.W. $\frac{3}{4}$ S., $1\frac{1}{4}$ m.—Warner Lt.-vessel, N.W. by W. $\frac{1}{2}$ W., 3 m.—Dean Elbow Buoy, N.W. by W., $1\frac{1}{4}$ m.
DEAN ELBOW buoy, *black* (can), in 30 ft.	The S. side of No-mans Land fort on with Old Castle Pt., N.W. by W.—Water tower in Eastney barracks on with E. end of Southwick fort on Portsdown hill, N. $\frac{1}{4}$ W.—Nab Lt.-vessel, S. $\frac{3}{4}$ E., $1\frac{7}{10}$ m.—Dean buoy, N.W. $\frac{1}{3}$ W., $1\frac{2}{10}$ m.
DEAN buoy, *black* (can), in 36 ft., at about 200 yds. outside edge of shoal.	Water tower in Eastney barracks on with W. end of Widley fort on Portsdown hill, N. by E. $\frac{1}{4}$ E.—Ryde windmill on with upper corner of a triangular field, W. $\frac{1}{2}$ N.—Nab Lt.-vessel, S.S.E. $\frac{1}{4}$ E., $2\frac{7}{10}$ m.—Warner Lt.-vessel, W. $\frac{3}{4}$ S., $\frac{8}{10}$ m.—Horse Elbow buoy, N.W. $\frac{1}{4}$ N., $\frac{6}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
HORSE ELBOW buoy, *black* (can), in 30 ft. The shoal here is steep-to. At 200 yds. outside the buoy the depth is 10 fms.	Kickergill tower on with N.E. end of Fort Monkton, N.N.W. $\frac{1}{2}$ W.—Asheydown tower just open S. of houses on Nettlestone P., W. by S. $\frac{1}{4}$ S.—Nab Lt.-vessel, S.S.E. $\frac{1}{2}$ E., $3\frac{1}{3}$ m.—Warner Lt.-vessel, S.S.W. $\frac{3}{4}$ W., $\frac{2}{3}$ m.—Horse fort, N. by W., $\frac{2}{3}$ m.
OUTER SPIT buoy, *chequered black* and *white* (conical), in $3\frac{1}{2}$ fms., on S.E. part of bank extending off Spit sand.	The E. side of No-mans Land fort in line with Yarborough monument on Isle of Wight, S.S.W. $\frac{1}{4}$ W.—Spit Refuge Buoy, N. by E. $\frac{3}{4}$ E., $\frac{1}{2}$ m.—Gilkicker Pt., N.W. $\frac{1}{4}$ W.—Horse fort, S.S.E. $\frac{1}{2}$ E., 1 m.
SPIT buoy, *chequered black* and *white* (Refuge bell buoy), in 22 ft. at S.E. extreme of Spit sand.	The E. Swatchway beacon, halfway between St. Pauls ch. and W. end of large chalkpit on Portsdown hill, N. by E. $\frac{1}{2}$ E.—Gilkicker Pt., N.W. by W. $\frac{1}{2}$ W.
BOYNE buoy, *green* (nun), in 5 fms., at 170 ft. W. $\frac{3}{4}$ N. from the wreck of Boyne, on W. edge of Horse sand. There is only 19 ft. on wreck.	The E. Swatchway beacon, halfway between St. Johns ch. and E. end of trees on Portsmouth lines, N. $\frac{1}{4}$ E.—Dock mill in line with London road over Portsdown hill, N.E. by N.

BETWEEN SPITHEAD AND DOWNS.

LANGSTON HARBOUR Fairway buoy, *striped black* and *white horizontally* (conical, and marked L. F. W.), in $1\frac{3}{4}$ fms.	Milton ch. spire three times its width open W. of Engine chimney, N.W. by N.—S. Hayling ch. spire E. $\frac{2}{3}$ N.
BULLOCK PATCH buoy, *black* (can), in 7 fms., at $\frac{1}{4}$ m. S.W. of patch.	Asheydown tower open S. of Bembridge ch., W. by N. $\frac{1}{2}$ N.—The largest of the easternmost chalkpits on Portsdown mill in line with westernmost terrace at Hayling, N. $\frac{1}{2}$ W.—Boulder buoy, S.E. $\frac{1}{4}$ E., $3\frac{4}{10}$ m.—Pullar buoy, S.E. by E. $\frac{1}{2}$ E., $3\frac{6}{10}$ m.—Dean Tail buoy, N.W. $\frac{1}{2}$ N., $3\frac{2}{10}$ m.—Nab Lt.-vessel, N.W. by W. $\frac{1}{2}$ W., $3\frac{1}{10}$ m.
BOULDER buoy, *black* (conical), in 9 fms. off S.W. part of Boulder bank.	Chichester spire in line with Medmery barn, N.N.E. $\frac{3}{4}$ E.—The easternmost end of trees on Hayling island on with W. end of westernmost battery on Portsdown hill, N. by W. $\frac{1}{2}$ W.—Nab Lt.-vessel, N.W. $\frac{3}{4}$ W., $6\frac{1}{2}$ m.—Owers Lt.-vessel, S.E. $\frac{3}{4}$ E., $6\frac{1}{2}$ m.
EAST BANK OF OWERS buoy (marked East Boro Head), *chequered black* and *white* (conical, with *staff* and *cage*), in $4\frac{1}{2}$ fms., a short distance E. of shoalest part, 19 ft.	Pagham ch. turret in line with grove of yew-trees (called Fountingden Wood), N. by W.—Selsea mill open N. of white boat ho. on Selsea green, N.W. $\frac{1}{4}$ N.—Owers Lt.-vessel, S.S.W. $\frac{1}{4}$ W., $2\frac{3}{4}$ m.—Owers Middle buoy, W. $\frac{1}{4}$ N., $3\frac{2}{10}$ m.—Pullar buoy, W.N.W., 6 m.—Mixon beacon, N.W. by W., $4\frac{1}{10}$ m.—Shelly buoy, N.E. $\frac{1}{4}$ N., $4\frac{7}{10}$ m.—Winter buoy, N.E. by E., $5\frac{7}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
DRIES buoy, *black* (conical, and marked Street), in 2 fms.	The Luff in line with Selsea Bill, N.E. by E. $\frac{1}{4}$ E.—Chichester spire open E. of Selsea coast-guard, N.N.E. $\frac{1}{2}$ E.—Mixon beacon, E. $\frac{3}{4}$ S., $1\frac{4}{10}$ m.—E. bank of Owers buoy, S.E. by E. $\frac{1}{2}$ E., $5\frac{6}{10}$ m.—Owers Middle buoy, S.E. $\frac{1}{2}$ S., $2\frac{9}{10}$ m.—Pullar buoy, S.W. by W., $\frac{8}{10}$ m.—Nab Lt.-vessel, W.N.W., 7 m.
PULLAR buoy, *striped black* and *white vertically* (conical, with *staff* and *cage*), in 2 fms.	Chichester spire nearly in line with centre of lower grove of trees W. of Selsea mill, N.N.E. $\frac{3}{4}$ E.—The Luff and Selsea Bill in line, N.E. by E. $\frac{1}{4}$ E.—Mixon beacon, E. $\frac{1}{2}$ N., $2\frac{1}{10}$ m.—Owers Middle buoy, S.E. $\frac{1}{2}$ E., $3\frac{1}{10}$ m.
MIXON BEACON, an *iron pillar* with *a cage*, 30 ft. above H.W. sps.	Owers Lt.-vessel, S.S.E. $\frac{1}{4}$ E., $5\frac{3}{10}$ m.—Owers Middle buoy, S. $\frac{3}{4}$ E., $2\frac{2}{10}$ m.
OWERS MIDDLE buoy, *chequered black* and *white* (can), in 5 fms.	Chichester spire twice its apparent length E. of Selsea Corner, N. by E. $\frac{1}{4}$ E.—The Luff in line with Felpham ch., N.E. $\frac{1}{4}$ E.—Owers Lt.-vessel, S.E. $\frac{1}{2}$ S., $3\frac{3}{10}$ m.
SHELLY buoy, *black* (conical), in 4 fms., on S.E. side of rocks.	Arundel ch. tower in line with coast-guard at Elmer, N.E. $\frac{1}{4}$ N.—Chichester spire in line with Felpham Station-ho., N.W. by N.—Owers Lt.-vessel, S.W. $\frac{3}{4}$ S., $7\frac{3}{10}$ m.—Mixon beacon, W. $\frac{3}{4}$ S., $6\frac{8}{10}$ m.—Winter buoy, E. by S. Southerly, $1\frac{7}{10}$ m.
WINTER buoy, *black* (can), in 3 fms. off S. side of knoll.	Domo ho. at Bognor, its width N. of Felpham *black* mill, N.W. $\frac{1}{4}$ W.—Dry lodge (on the high land) in line with Brook Pit ho., N.N.E. $\frac{1}{2}$ E.—Little Hampton pier Lt., N.E. $\frac{1}{2}$ E., $2\frac{4}{10}$ m.—Owers Lt.-vessel, S.W. $\frac{1}{4}$ W., $8\frac{2}{10}$ m.
ROYAL SOVEREIGN buoy, *striped black* and *white vertically* (large bell buoy with *staff* and *cage*), in 6 fms., at 100 yds. S. of 9 ft. patch on shoals.	Signal-ho. on Beachy Hd., W. by N. $\frac{1}{2}$ N., $6\frac{3}{4}$ m.—1st martella tower E. of Eastbourne in line with W. end of E. clump of trees E. of Willingdon, N.W. $\frac{1}{4}$ N.—Fairlight mill (see foot-note, p. 76) just open S. of Hastings castle cliff, N.E. by E. $\frac{1}{2}$ E.
NEWCOMBE buoy (marked Roar Spit), *chequered black* and *white*, in 16 ft., on edge of the bank.	Dungeness Lt., S.W. $\frac{1}{4}$ W., $1\frac{1}{2}$ m.—1st battery on beach northward of Lt., W. by N., $\frac{3}{4}$ m.
VARNE N.E. buoy, *red* (large spiral buoy, with *staff* and *ball*), in 13 fms., off N.E. end of shoal.	Dungeness Lt., W., $16\frac{1}{4}$ m.—Folkestone ch., N.W. $\frac{3}{4}$ N., 8 m.—S. Foreland high Lt., N.N.E., 8 m.—Cape Gris-Nez Lt., S.S.E. $\frac{1}{4}$ E., $11\frac{3}{4}$ m.—Varne Lt., S.W. by W. $\frac{1}{4}$ W., $5\frac{3}{4}$ m.

Name, Colour, and Position of Buoy.	Marks.
GOODWIN SANDS.	
SOUTH GOODWIN buoy, *chequered black* and *white* (large conical, with *staff* and *cage*), in 15½ fms., off S.E. part of S. Calliper.	Ringwold ch. just open S. of flagstaff of Mr. Curling's ho. at Kingsdown, W.N.W.—Coastguard ho. on Cornhill on with S. Foreland Low Lt.-ho., W. ¼ S.—S. Sand Hd. Lt.-vessel, W. by S. ½ S., 3 m.—E. Goodwin Lt.-vessel E. by N. ½ N., $3\frac{6}{10}$ m.—S.E. Goodwin buoy, N.E. by E. ¼ E., 3 m.
S.E. GOODWIN buoy, *striped black* and *white vertically* (large conical, with *staff* and *cage*), in 17 fms., off N. part of S. Calliper.	Lord Warden Hotel at Dover just touching S. Foreland, W. by S. ¼ S.—Northbourne mill on with Time Ball at Deal, W. by N. ¾ N.—E. Goodwin Lt.-vessel E.S.E., $1\frac{1}{10}$ m.—E. Goodwin buoy, N.E. by N., 2½ m.
E. GOODWIN buoy, *chequered black* and *white* (large conical, with *St. Andrews Cross*), in 19 fms., off S.E. part of N. Goodwin.	N. Sand Hd. Lts. just open W. of N.E. Goodwin buoy, N. by E. ½ E.—Upper Deal mill open N. of St. Saviours ch. at Deal, W. ¼ S.—Highest part of N. cliff in St. Margaret bay in line with Goodwin Beacon, W.S.W.—Gull Lt., N.W. by W. ¾ W., 4½ m.—N.E. Goodwin buoy, N. by E. ½ E., 2 m.
N.E. GOODWIN buoy, *striped black* and *white vertically* (without *beacon*), in 11 fms., off N.E. part of N. Goodwin.	S. Foreland High Lt.-ho. on with extreme end of cliff at St. Margaret bay, S.W. by W. ½ W.—St. Georges ch. at Ramsgate ⅓ along from the gap to the N.E. half of Wellington crescent, N.W. ¼ W.—Upper Deal mill in line with S.W. end of Deal hospital, W. by S. ¼ S.—N. Sand Hd. Lts., N. by E. ¼ E., 2 m.—Goodwin Knoll buoy, N.N.W. ½ W., 2 m.
GULL STREAM.	
BUNT HEAD buoy, *black* (conical), in 5½ fms., off an elbow of Goodwin projecting into S. part of Gull Stream.	Upper Deal mill, its width open S. of St. Saviours ch., W.—Ramsgate pier Lt.-ho. in line with St. George's ch., Ramsgate, N. ¼ E.—Gull Lt., N.N.E., $2\frac{1}{2}$m.—N.W. Bunt buoy, N.E. ¾ N., $1\frac{2}{10}$ m.—S. Brake buoy, N. ¾ W., $1\frac{4}{10}$ m.—S. Sand Hd. Lt., S. by W. ¾ W., $4\frac{6}{10}$ m.
N.W. BUNT buoy, *black*, in 6 fms.	First mill S. of Sandown castle on with Northbourne mill, W. ½ N.—N. end of new coastguard station in Old Stairs bay touching the chancel end of St. Margarets ch., S.W. ¾ W.—Gull Lt., N. by E., $1\frac{2}{10}$ m.—S. Brake buoy N.W. by W. ¾ W., nearly 1 m.
N.W. GOODWIN buoy, *black* (conical), in 13 fms., near spit of dry sand on N.W. side of N. Goodwin.	East Bottom semaphore, its width open W. of S. Foreland high Lt.-ho., S.W. ¼ W.—St. Georges ch., Ramsgate, in line with the obelisk, N.N.W.—N. Bar buoy, N. by E., 2 m.—Gull buoy N.N.E. ¾ E., $2\frac{6}{10}$ m.—Goodwin Knoll buoy, E.N.E., $2\frac{9}{10}$ m.—Middle Brake buoy, N.W. by W. ¾ W., $1\frac{7}{10}$ m.—Gull Lt., S.W. by W. ¾ W., $1\frac{4}{10}$ m.

Name, Colour, and Position of Buoy.	Marks.
GOODWIN KNOLL buoy, *black* (conical), in 5 fms., on N.W. edge of knoll.	Gull Lt., S.W. by W. $\frac{3}{4}$ W., $4\frac{2}{10}$ m.—N. Foreland Lt., N.N.W. $\frac{3}{4}$ W.—N. Saud Hd. Lt., E. $\frac{3}{4}$ N., $1\frac{4}{10}$ m.—Gull buoy, N.W. $\frac{1}{2}$ W., $1\frac{6}{10}$ m.
DEAL BANK buoy, *chequered black* and *white*, in 4 fms., off E. side of bank.	S. end of Deal Hospital on with Upper Deal Mill, W. by S. $\frac{1}{4}$ S.—Woodnesborough ch. just open of N. end of Deal terrace, N.W.—Bunt Hd. buoy, E. by S. $\frac{1}{2}$ S., $1\frac{4}{10}$ m.—S. Brake buoy, N.E. $\frac{3}{4}$ E., $1\frac{1}{2}$ m.—S. Fairway buoy, N. by E. $\frac{1}{4}$ E., $2\frac{3}{4}$ m.
S. BRAKE buoy, *striped black* and *white horizontally* (spherical bnoy with *diamond* on top), in 6 fms., off S. end of Brake sand.	N. Foreland Lt.-ho. just open E. of Broadstairs N. cliff, N. by E. $\frac{1}{2}$ E.—Upper Deal mill on with Time Ball, W.S.W.—S. Sand Hd. Lt., S. by W. $\frac{1}{4}$ W., $5\frac{8}{10}$ m.—Gull Lt., N.E. by E., $1\frac{3}{10}$ m. Middle Brake buoy, N.N.E., $2\frac{2}{10}$ m.
MIDDLE BRAKE buoy, *chequered black* and *white*, in 5 fms., near E. edge of Brake.	S. Foreland high Lt., S.W. $\frac{1}{2}$ S.—Gull Lt., S. by E., $1\frac{3}{10}$ m.—N. Brake buoy, N.E. by N., $2\frac{1}{2}$ m.—N. Bar buoy, N.E. $\frac{3}{4}$ E., $2\frac{1}{2}$ m.—Gull buoy, N.E. by E. $\frac{1}{2}$ E., $3\frac{4}{15}$ m.
N. BRAKE buoy, *striped black* and *white vertically*, in 3 fms., on N.E. part of Brake.	St. Lawrence ch. on with E. cliff at Ramsgate, N.W. $\frac{3}{4}$ W.—N. Foreland Lt., N. $\frac{1}{4}$ E.—Ramsgate pier Lt., N.W. by W. $\frac{1}{2}$ W.
N. BAR KNOLL buoy, *striped black* and *white horizontally*, in 12 ft. on knoll.	St. Clements ch., at Sandwich, its breadth open S. of Woodnesborough ch., W. $\frac{1}{2}$ S.—St. Lawrence ch., N.W. $\frac{1}{2}$ W.—Gull buoy, E. by N., 1 m.—N. Sand Hd. Lts., E. by S., $3\frac{6}{10}$ m.—Gull Lt., S.W. by S., $3\frac{1}{10}$ m.
GULL SAND buoy, *chequered black* and *white* (conical), in 6 fms., at $\frac{3}{4}$ m. S.E. of shoalest part of 18 ft.	St. Lawrence ch. on with centre of Augusta stairs, Ramsgate, N.W. by W. $\frac{1}{2}$ W.—S. Foreland high Lt. on with end of N. cliff of Old Stairs bay, S.W., and also *nearly in line* with Gull Lt.—Elbow buoy, N. by E. $\frac{1}{4}$ E., $2\frac{1}{2}$ m.—N. Sand Hd. Lts., E. by S. $\frac{1}{2}$ S., $2\frac{7}{10}$ m.—Gull Lt., S.W. $\frac{1}{4}$ S., nearly 4 m.—N. Brake buoy, W. by N. $\frac{1}{4}$ N., $1\frac{6}{10}$ m.
ELBOW buoy, *striped black* and *white vertically* (conical, with *staff* and *cage*), in 5 fms., on E. edge of shoal.	St. Lawrence ch. tower open N. of Dumpton Pt., W. $\frac{1}{2}$ S.—N. Foreland Lt., N.W. by W $\frac{1}{4}$ W., $2\frac{4}{10}$ m.—E. buoy of Margate Sand, N. by W. $\frac{1}{4}$ W., $5\frac{4}{10}$ m.
BROADSTAIRS KNOLLS buoy, *chequered black* and *white*, in $3\frac{1}{4}$ fms., on outer edge of knolls, $1\frac{1}{4}$ m. off shore.	The apparent width of tower of St. Georges ch. at Ramsgate, open S. of Hearsons mill, W. $\frac{1}{2}$ S.—St. Peters ch. tower on with N. side of house on end of N. cliff at Broadstairs, N.W. $\frac{3}{4}$ W.—Elbow buoy E. by N. $\frac{1}{4}$ N., $1\frac{3}{10}$ m.—Gull buoy S. by E. $\frac{3}{4}$ E., $2\frac{2}{10}$ m.—N. Bar buoy, S. $\frac{1}{2}$ W., $2\frac{4}{10}$ m.—N. Brake buoy, S.S.W. $\frac{1}{4}$ W., $1\frac{9}{10}$.

PRINCIPAL DIMENSIONS OF PRIVATE GRAVING-DOCKS, &c., IN DIFFERENT HARBOURS ON THE ENGLISH COAST.

Name of Port.	Graving Docks.				Patent Slips.	Grid-irons.	Rise of Tide.	
	No.	Length over all.	Breadth of Entrance.	Depth over Sill at High Water Ordinary Springs.			Ordinary Springs.	Ordinary Neaps.
		ft.	ft.	ft.	No.	No.	ft.	ft.
Penzance - -	1	128	35	12	—	—	16	12½
Falmouth - -	1	400	65	17	—	1	16	12
,,	1	350	50	14½	—	—	16	12
Plymouth, Catwater	1	190	45	14	2	—	15½	11½
,, Sutton Pool	1	265	50	16	2	—	15½	11½
,, Mill Bay -	1	367	80	22*	—	—	15½	11½
Dartmouth - -	—	—	—	—	2	1	14	10
Teignmouth -	—	—	—	—	2	—	13	9½
Exmouth, Topsham	1	190	32	10	—	—	11¼	8¼
Weymouth - -	—	—	—	—	1	1	6¾	4½
Southampton -	3	475 346 282	80 66 51	26* 20* 14*	—	—	13	9½
Cowes - - -	2	330 140	56 36	16½ 12½	1	—	12½	9½
Portsmouth, Town Camber.	1	349	50	17¼	—	—	12½	10
Portsmouth, Inner Camber.	—	—	—	—	1	—	12½	10
Little Hampton -	—	—	—	—	1	1	16	11½
Shoreham - -	—	—	—	—	2	—	18	13¼
Newhaven - -	—	—	—	—	—	1	20	15
Rye - - -	—	—	—	—	1	—	15½	10½
Folkestone - -	—	—	—	—	1	1	17	13
Dover - - -	—	—	—	—	1	—	18¾	15
Ramsgate - -	—	—	—	—	1	—	15	12

* On blocks.

A USEFUL TABLE FOR VESSELS CROSSING THE BANKS INSIDE THE ISLE OF WIGHT.

SHOWING the Depth of Water, in Feet and Inches, under *ordinary* circumstances, over the *shoalest* part of the Banks, and in some of the Channels inside the Isle of Wight, at Hourly Intervals of the Tide. But should the depth be required between Springs and Neaps, it will be necessary to interpolate. It is probable that more or less water occasionally may be found on the day of the greatest rise or fall, than is here allowed for; but the utmost difference can scarcely amount to more than six inches.

A continuance of N.E. winds has the effect of keeping the tides back, while S.W. winds have a contrary effect.

	Ordinary Springs.														Ordinary Neaps.													
	On a rising Tide.									On a falling Tide.					On a rising Tide.								On a falling Tide.				
	L.W.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	H.W.	1h.	2h.	3h.	4h.	5h. or L.W.	L.W.	1h.	2h.	3h.	4h.	5h.	6h.	7h. or H.W.	1h.	2h.	3h.	4h.	5h. or L.W.
Sturbridge bank (p. 52)	f. in. 16 3	f. in. 17 9	f. in. 19 6	f. in. 20 9	f. in. 22 3	f. in. 25 0	f. in. 27 6	f. in. 29 0	f. in. 29 3	f. in. 28 6	f. in. 27 0	f. in. 23 9	f. in. 18 9	f. in. 16 3	f. in. 20 6	f. in. 20 9	f. in. 21 3	f. in. 21 9	f. in. 22 9	f. in. 24 3	f. in. 25 9	f. in. 26 6	f. in. 26 3	f. in. 25 3	f. in. 23 6	f. in. 21 6	f. in. 20 0
Ryde Sand Head (p. 59)	—	awash	1 9	2 9	4 6	7 3	9 9	11 3	11 6	10 6	9 3	6 0	1 0	—	2 9	3 0	3 6	4 0	5 0	6 6	8 0	8 9	8 6	7 6	5 9	3 9	2 9
No-mans Land bank (p. 59)	7 6	9 0	10 9	12 0	13 6	16 3	18 9	20 3	20 6	19 9	18 3	15 0	10 0	7 6	11 9	12 0	12 6	13 0	13 9	15 6	17 0	17 9	17 6	16 6	14 9	12 9	11 9
Warner bank and St. Helens patch (pp. 57, 58)	17 0	18 6	20 3	21 6	23 0	26 9	28 3	29 9	30 0	29 3	27 9	24 6	19 6	17 0	21 3	21 6	22 0	22 6	23 6	25 0	26 6	27 3	27 0	26 0	24 3	22 3	21 3
Princessa shoal and channel inside Warner (pp. 56, 61)	19 0	20 6	22 3	23 6	25 0	27 9	30 3	31 9	32 0	31 3	29 9	26 6	21 6	19 0	23 3	23 6	24 0	24 6	26 6	27 0	28 6	29 3	29 0	28 0	26 3	24 3	23 3
Bembridge ledge (p. 56)	—	—	1 3	2 8	4 0	6 9	9 3	10 9	11 0	10 3	8 9	5 6	0 6	—	2 3	2 6	3 0	3 6	4 6	6 0	7 6	8 3	8 0	7 0	5 3	3 3	2 3
Long and Nab rocks (p. 57)	23 0	24 6	26 3	27 6	29 0	31 9	34 3	35 9	36 0	35 3	33 9	30 6	25 6	23 0	27 3	27 6	28 0	28 6	29 6	31 0	32 6	33 3	33 0	32 0	30 3	28 3	7 3
Portsmouth harbour Bar (p. 62)	17 0	18 6	20 6	21 6	23 0	25 9	28 3	29 9	30 0	29 3	27 9	24 6	19 6	17 0	21 3	21 8	22 0	22 6	23 6	25 0	26 6	27 6	27 0	26 0	24 3	22 3	19 3
Swatchway, Spit sand, marks on (p. 63)	7 0	8 6	10 3	11 6	13 0	15 9	18 3	19 9	20 0	19 3	17 9	14 6	9 6	7 0	11 3	11 6	12 0	12 6	13 3	15 0	16 6	17 3	17 0	16 0	14 3	12 3	11 3

Hamilton and Harrow banks (p. 63) – –	1 0	2 6	4 3	5 6	7 0	9 9	12 3	13 9	14 0	13 3	11 9	8 6	3 0	1 0	5 3	5 6	6 0	6 6	7 6	9 0	10 6	11 3	11 0	10 0	8 3	6 3	5 3
Channel inside Hamilton bank (p. 63) –	4 0	5 6	7 3	8 6	10 0	12 9	15 3	16 9	17 0	16 3	14 9	11 8	6 6	4 0	8 3	8 6	9 0	9 6	10 6	12 0	13 6	14 3	14 0	13 0	11 3	9 3	8 9
Channel east of Hamilton bank (p. 63) –	6 6	8 0	9 9	11 0	12 6	15 3	17 9	19 3	19 6	18 9	17 3	14 0	9 0	6 6	10 9	11 0	11 6	12 0	12 9	14 6	16 0	16 9	16 6	15 6	13 9	11 9	10 9
Ridge Shoal, S.E. end of Spit sand (p. 63)–	3 0	4 6	6 3	7 6	9 0	11 9	14 3	15 9	16 0	15 3	13 9	10 6	5 6	3 0	7 3	7 6	8 0	8 6	9 3	11 0	12 6	13 3	13 0	12 0	10 3	8 3	7 3
Horse sand — Blockhouse fort just open of Southsea castle (p. 61) – – –	7 0	8 6	10 3	11 6	13 0	15 9	18 3	19 9	20 0	19 3	17 9	14 6	9 6	7 0	11 3	11 6	12 0	12 6	13 3	15 0	16 6	17 3	17 0	16 0	14 3	12 3	11 3
Horse sand — Haslar bospital just open of Southsea castle (p. 65) – – –	5 0	6 6	8 3	9 6	11 0	13 9	16 3	17 9	18 0	17 3	15 9	12 6	7 6	5 0	9 3	9 6	10 0	10 6	11 3	13 0	14 6	15 3	15 0	14 0	12 3	10 3	9 3
Langston harbour Bar (p. 65) – – –	1 0	2 6	4 3	5 6	7 0	9 9	12 3	13 9	14 0	13 3	11 9	8 6	3 6	1 0	5 3	5 6	6 0	6 6	7 6	9 0	10 6	11 3	11 0	10 0	8 3	6 3	5 3
Hayling shoal (p. 65) –	8 6	10 0	11 9	13 0	14 6	17 3	19 9	21 3	21 6	20 9	19 3	16 0	11 0	8 6	12 9	13 0	13 6	14 0	15 0	16 6	18 0	18 9	18 6	17 6	15 9	13 9	12 9
Chichester harbour Bar (p. 85) – – –	2 0	3 6	5 3	6 8	8 0	10 9	13 3	14 9	15 0	14 3	12 9	9 6	4 6	2 0	6 3	8 6	7 0	7 6	8 6	10 0	11 6	12 3	12 0	11 0	9 3	7 3	6 3
Medmerry bank (p. 65)	13 0	14 6	16 3	17 6	19 0	21 9	24 3	25 9	26 0	25 3	23 9	20 6	15 6	13 0	17 3	17 6	18 0	18 6	19 6	21 0	22 6	23 3	23 0	22 0	20 3	18 3	17 3
Cross ledge — West entrance of Looe; marks on (p. 67) –	14 6	14 3	16 0	18 3	21 9	25 6	28 3	29 9	30 6	28 9	25 9	21 6	17 6	14 6	19 3	18 9	19 6	20 6	22 6	24 6	26 0	27 3	26 9	25 3	23 0	20 9	19 3
Boulder bank, Middle and shoal of Lead (p. 67) – – –	2 6	2 3	4 0	6 3	9 9	13 6	16 3	17 9	18 0	16 9	13 9	9 6	5 6	2 6	7 3	6 9	7 6	8 6	10 6	12 6	14 0	15 3	14 9	13 3	11 0	8 9	7 3
Eastborough Head and anywbere between Middle Ground and Boulder bank (p. 68)	6 6	6 3	8 0	10 3	13 9	17 6	20 3	21 9	22 0	20 9	17 9	13 6	9 6	6 6	11 3	10 9	11 6	12 6	14 6	16 6	18 0	19 3	18 9	17 3	15 0	12 9	11 3

THE NUMBER OF MILES OR MINUTES OF THE EQUATOR CONTAINED IN A DEGREE OF LONGITUDE UNDER EACH PARALLEL OF LATITUDE FOR THE SPHEROID—THE COMPRESSION OF THE EARTH BEING ASSUMED $\frac{1}{304}$.

Lat.	Length of Degree.	Lat.	Length of Degree.	Lat.	Length of Degree.
°	′	°	′	°	′
0	60·003	31	51·475	61	29·161
1	59·991	32	50·930	62	28·240
2	59·964	33	50·370	63	27·310
3	59·918	34	49·793	64	26·372
4	59·854	35	49·202	65	25·426
5	59·773	36	48·596	66	24·471
6	59·673	37	47·975	67	23·509
7	59·556	38	47·339	68	22·540
8	59·419	39	46·688	69	21·564
9	59·266	40	46·021	70	20·581
10	59·094	41	45·346	71	19·592
11	58·905	42	44·654	72	18·596
12	58·697	43	43·948	73	17·595
13	58·472	44	43·229	74	16·588
14	58·229	45	42·495	75	15·577
15	57·968	46	41·750	76	14·560
16	57·690	47	40·992	77	13·539
17	57·394	48	40·220	78	12·514
18	57·081	49	39·437	79	11·485
19	56·751	50	38·642	80	10·452
20	56·403	51	37·834	81	9·416
21	56·038	52	37·015	82	8·377
22	55·657	53	36·185	83	7·336
23	55·258	54	35·343	84	6·292
24	54·842	55	34·400	85	5·246
25	54·410	56	33·627	86	4·199
26	53·962	57	32·754	87	3·150
27	53·496	58	31·870	88	2·101
28	53·015	59	30·977	89	1·050
29	52·518	60	30·074	90	0·000
30	52·004				

TO FIND THE DISTANCE OF AN OBJECT BY TWO BEARINGS, AND THE DISTANCE RUN BETWEEN THEM.

When the ship's path lies across the line of direction of the object, the distance can be obtained by two bearings, and the distance run by the ship in the interval of time between them.

By Two Bearings of same Object.

Take the bearing of the object, and note the number of points contained between it and ship's head. After the bearing has altered not less than 2 or 3 points, note the number of points in the same angle again. The ship is supposed to keep the same course; if not, the course made good must be employed, and the local deviation, if considerable, allowed for, as it will affect the different courses differently.

To find the distance when the *last* bearing was taken:—Enter the Table with the first number of points at the top, and the second number of points at the side; take out the number corresponding, and multiply it by the number of miles made good by the ship; the result is the Dist. in miles at the time the *last* bearing was taken.

Example.—The Eddystone bore N.W. by W.; after running W. by S. 8 miles, it bore N.N.E.: required its Dist. at this last bearing.

The number of points between N.W. by W. and W. by S. is 4; that between N.N.E. and W. by S. is 11; under 4 at the top and against 11 at the side stands 0·72, which multiplied by 8 (miles), gives 5·8 miles, the Dist. required.

Diff. between Course and 2nd Bearing.	Difference between Course and 1st Bearing.																
	Points.																
Points.	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
3½	1·00																
4	1·00																
4½	0·81	1·23															
5	0·69	1·00	1·45														
5½	0·60	0·85	1·17	1·66													
6	0·54	0·74	1·00	1·35	1·85												
6½	0·49	0·67	0·88	1·14	1·50	2·02											
7	0·46	0·61	0·79	1·00	1·27	1·64	2·17										
7½	0·43	0·57	0·72	0·90	1·11	1·39	1·77	2·30									
8	0·41	0·53	0·67	0·82	1·00	1·22	1·50	1·87	2·41								
8½	0·40	0·61	0·63	0·76	0·92	1·09	1·31	1·58	1·96	2·60							
9	0·39	0·49	0·80	0·72	0·85	1·00	1·18	1·39	1·66	2·03	2·66						
9½	0·38	0·48	0·58	0·69	0·80	0·93	1·08	1·25	1·46	1·72	2·08	2·60					
10	0·38	0·47	0·67	0·66	0·76	0·88	1·00	1·14	1·31	1·51	1·76	2·11	2·61				
10½	0·38	0·47	0·56	0·65	0·74	0·84	0·94	1·06	1·19	1.36	1·65	1·79	2·12	2·60			
11	0·39	0·47	0·56	0·64	0·72	0·81	0·90	1·00	1·11	1·24	1·39	1·57	1·80	2·11	2·56		
11½	0·40	0·48	0·56	0 63	0·71	0·79	0·87	0·95	1·05	1·15	1·27	1·41	1·58	1·79	2·0	2·50	
12	0·41	0·49	0·57	0·64	0·71	0·78	0·86	0·92	1·00	1·08	1·18	1·29	1·41	1·67	1·76	2·03	1·41
12½	0·43	0·51	0·58	0·65	0·71	0·77	0·83	0·90	0·97	1·03	1·11	1·20	1·29	1·41	1·65	1·72	1·96

FOR REDUCING GEOGRAPHICAL MILES (OF 6,080 FEET) TO ENGLISH STATUTE MILES, AND ENGLISH STATUTE TO GEOGRAPHICAL.

1 Geographic mile = 1·15151515 English statute mile.
1 English statute mile = 0·86842105 Geographic mile.

Geogr. or Engl. Statute Miles.	English Statute Miles and Dec. Parts.	Geographic Miles and Dec. Parts.	Geogr. or Engl. Statute Miles.	English Statute Miles and Dec. Parts.	Geographic Miles and Dec. Parts.	Geogr. or Engl. Statute Miles.	English Statute Miles and Dec. Parts.	Geographic Miles and Dec. Parts.
1	1·152	0·868	38	43·758	33·000	75	86·364	65·132
2	2·303	1·737	39	44·909	33·868	76	87·515	66·000
3	3·455	2·605	40	46·061	34·737	77	88·667	66·868
4	4·606	3·474	41	47·212	35·605	78	89·818	67·737
5	5·758	4·342	42	48·364	36·474	79	90·970	68·605
6	6·909	5·211	43	49·515	37·342	80	92·121	69·474
7	8·061	6·079	44	50·667	38·211	81	93·273	70·342
8	9·212	6·947	45	51·818	39·079	82	94·424	71·211
9	10·364	7·816	46	52·970	39·947	83	95·576	72·079
10	11·515	8·684	47	54·121	40·816	84	96·727	72·947
11	12·667	9·553	48	55·273	41·684	85	97·879	73·816
12	13·818	10·421	49	56·424	42·553	86	99·030	74·684
13	14·970	11·289	50	57·576	43·421	87	100·182	75·553
14	16·121	12·158	51	58·727	44·289	88	101·333	76·421
15	17·273	13·026	52	59·879	45·158	89	102·485	77·289
16	18·424	13·895	53	61·030	46·026	90	103·636	78·158
17	19·576	14·763	54	62·182	46·895	91	104·788	79·026
18	20·727	15·632	55	63·333	47·763	92	105·939	79·895
19	21·879	16·500	56	64·485	48·632	93	107·091	80·763
20	23·030	17·368	57	65·636	49·500	94	108·242	81·632
21	24·182	18·237	58	66·788	50·368	95	109·394	82·500
22	25·333	19·105	59	67·939	51·237	96	110·545	83·368
23	26·485	19·974	60	69·091	52·105	97	111·697	84·237
24	27·636	20·842	61	70·242	52·974	98	112·848	85·105
25	28·788	21·711	62	71·394	53·842	99	114·000	85·974
26	29·939	22·579	63	72·545	54·711	100	115·152	86·842
27	31·091	23·447	64	73·697	55·579	200	230·303	173·684
28	32·242	24·316	65	74·848	56·447	300	345·455	260·526
29	33·394	25·184	66	76·000	57·316	400	460·606	347·368
30	34·545	26·053	67	77·152	58·184	500	575·758	434·211
31	35·697	26·921	68	78·303	59·053	600	690·909	521·053
32	36·848	27·789	69	79·455	59·921	700	806·061	607·895
33	38·000	28·658	70	80·606	60·789	800	921·212	694·737
34	39·152	29·526	71	81·758	61·658	900	1036·364	781·579
35	40·303	30·395	72	82·909	62·526	1000	1151·515	868·421
36	41·455	31·263	73	84·061	63·395	2000	2303·030	1736·842
37	42·606	32·132	74	85·212	64·263	3000	3454·545	2605·263

Example.—10 Geographic or Nautical miles = 11·515 English statute miles, 10 English statute miles = 8·684 Geographie miles.

TABLE SHOWING THE DISTANCE OF THE HORIZON AT DIFFERENT ELEVATIONS.

Height.	Distance to the Horizon.	Height.	Distance to the Horizon.	Height.	Distance to the Horizon.	Height.	Distance to the Horizon.	Height.	Distance to the Horizon.
ft.	nautical miles.	ft.	nautical miles.	ft.	nautical miles.	ft.	nautical miles.	ft.	nautical miles.
1	1·15	33	6·60	85	10·59	245	17·98	450	24·36
2	1·62	34	6·70	90	10·90	259	18·16	460	24·63
3	1·99	35	6·80	95	11·19	255	18·34	470	24·90
4	2·30	36	6·89	100	11·49	260	18·52	480	25·16
5	2·57	37	6·99	105	11·77	265	18·70	490	25·42
6	2·81	38	7·08	110	12·05	270	18·87	500	25·68
7	3·04	39	7·17	115	12·32	275	19·05	510	25·94
8	3·25	40	7·26	120	12·58	280	19·22	520	26·19
9	3·45	41	7·35	125	12·84	285	19·39	530	26·44
10	3·63	42	7·44	130	13·10	290	19·56	540	26·69
11	3·81	43	7·53	135	13·35	295	19·73	550	26·93
12	3·98	44	7·62	140	13·61	300	19·89	560	27·18
13	4·14	45	7·70	145	13·83	305	20·06	570	27·42
14	4·30	46	7·79	150	14·06	310	20·22	580	27·66
15	4·45	47	7·87	155	14·30	315	20·38	590	27·90
16	4·59	48	7·96	160	14·53	320	20·55	600	28·13
17	4·74	49	8·04	165	14·75	325	20·71	610	28·37
18	4·87	50	8·12	170	14·97	330	20·86	620	28·60
19	5·01	51	8·20	175	15·19	335	21·02	630	28·83
20	5·14	52	8·29	180	15·41	340	21·18	640	29·06
21	5·26	53	8·36	185	15·62	345	21·33	650	29·28
22	5·39	54	8·44	190	15·83	350	21·49	660	29·51
23	5·51	55	8·52	195	16·04	355	21·64	670	29·73
24	5·63	56	8·60	200	16·24	360	21·79	680	29·95
25	5·74	57	8·67	205	16·44	370	22·09	690	30·17
26	5·86	58	8·75	210	16·64	380	22·39	700	30·39
27	5·97	59	8·82	215	16·84	390	22·68	710	30·60
28	6·08	60	8·90	220	17·03	400	22·97	720	30·82
29	6·19	65	9·26	225	17·20	410	23·26	730	31·03
30	6·29	70	9·61	230	17·42	420	23·54	740	31·24
31	6·40	75	9·95	235	17·61	430	23·82	750	31·45
32	6·50	80	10·27	240	17·79	440	24·09	760	31·66

By this Table also the distance can be ascertained at which an object can be seen, according to its elevation and the elevation of the eye of the observer.

Example: A tower, 200 feet high, will be visible at 20¾ miles to an observer whose eye is elevated 15 feet above the water: thus—

15 feet elevation, distance visible 4·45 nautical miles.
200 „ „ „ „ 16·24 „

20·69

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